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LYMPHOCYTOSIS AS A DIAGNOSTIC AND PROGNOSTIC SYMPTOM IN CASES OF IRIDOCYCLITIS AFTER PERFORATING INJURY.[1]

BY DR. HARRY S. GRADLE, VOLUNTARY ASSISTANT.

FROM THE GERMAN EYE CLINIC OF PRAGUE. DIRECTOR PROF. A. ELSCHNIG.

IN histological sections of eyes which showed the characteristic changes of sympathetic ophthalmia, I was impressed with the fact that practically all the infiltration was formed by one type of cells. Not alone of the uvea was this true, but also of the infiltrated edges of fresh wounds, of the infiltration along vessels perforating the sclera, and even hypopyon, when present, was formed of the one type of cell. This type of cell is known as the mononuclear leucocyte. The query occurred to me whether such an extensive mononuclear infiltration would not be recorded by the circulating blood.

With this object in view, I examined the blood in cases of perforating injury of the eye with and without irido-cyclitis and in non-traumatic irido-cyclitis which could not lead to sympathetic ophthalmia. From the first the results were so unanimous that there was no question left in my mind regarding the truth of the problem. The exact limitations must be set by the examination of a large number of cases and the careful compiling of the subsequent statistics. Hence I take the liberty of presenting the problem with only a small number of records in the hope that time will bring out a sufficient number of cases to definitely establish the danger zone.

[1] An abstract of this paper was read at the annual meeting of the Heidelberg Ophthalmological Society, 1910.

In every instance I counted the total number of leucocytes, obtaining the blood by the usual method of puncturing the lobe of the ear. In smears, stained with the Jenner stain, I counted 200–300 white cells, classifying them as neutrophiles, eosinophiles, basophiles, large mononuclears (large lymphocytes and large mononuclears), and small mononuclears (lymphocytes), thus obtaining the percentage relationship of the various white cells. But in compiling results, I found that it was the relationship of the total number of polynuclears to the total number of mononuclears that was needed. It is the relationship of these two forms that I give in the following table with the cases:

Class A.

CASE 1.—E. J., 6 years, Dec. 24, '09. Perforating injury of left eye on day before by flying piece of wood. The wound extends completely through the cornea and about 4*mm* into the sclera. Iris prolapse and excision with subsequent prolapse of lens and vitreous. Three corneal and one scleral sutures. At first no irritation, but soon a severe chemosis which completely covered the edge of the cornea. Amaurosis.

Dec. 29th. Blood count: 36% mononuclear leucocytes.

Jan. 2d. Wound open; irido-cyclitis.

Jan. 3d. Exenteration. On this day, mononuclear-leucocytes 38.5%. Culture from contents of bulb remained sterile. Spirilla[1] found in iris. Normal healing. On the next day, mononuclear leucocytes dropped to 24.8%. Anatomical diagnosis: the typical picture of sympathetic ophthalmia. Average blood count from Dec. 26th to Jan. 3d, inclusive: leucocytes 15,640; polynuclears 65.0%; mononuclears 35.0%.

CASE 2.—J. W., 73 years, June 11, '09. Simple flap extraction of right eye with normal course. Aug. 1, '09: Combined flap extraction of left eye (vacation operation) with subsequent purulent infection: bacteriologically pneumococcus. In spite of cauterization, etc., the eye became shrunken and amaurotic.

Jan. 31, '10. Again entered. Irido-cyclitis in bulbo phthisico.

[1] "Spirillen bei Iridozyklitis nach perforierenden Augenverletzungen," Dr. Harry S. Gradle. *Klin. Monats-Blätter f. Augenh.*, xlviii., 1910, März.

Feb. 4th. Leucocytes 8,200; polynuclears 63.0%; mononuclears 37.0%.

Feb. 5th. Enucleated. Bulbar contents bacteriologically negative. No anatomical examination.

Case 3.—W. D., 50 years, Feb. 17, '10. Injury of the left eye by flying piece of coal. Received March 6, '10. Vertical extensive scar including ⅔ of the cornea. Iris partially torn, and swollen lens masses in the chamber. Intense ciliary injection. T−1. Projection downward absent.

March 8th. Linear extraction of the lens, and severe continued irritation.

March 13th. Hypopyon.

March 18th. Unmistakable plastic irido-cyclitis. Only temporal projection remaining. Mononuclear leucocytes 29.0%. Irido-cyclitis increasing in severity.

March 24th. Enucleation; spirilla found in anterior chamber contents, otherwise no micro-organisms.

March 22d. Leucocytes 11,200; polynuclears 71.0%; mononuclears 29.0%.

Case 4.—G. J., 30 years, March 13, '10. Perforating injury of right eye by iron splinter. Perforating conjunctival and scleral wound below the equator on the nasal side. A large foreign body in the vitreous and sanguineous retinal detachment visible. Projection absent upward. Extraction with the giant magnet. T−2. Next day, moderate irritation. Mononuclear leucocytes 28.0%.

March 15th. Unmistakable irido-cyclitis. Intense œdema of the lids and conjunctiva. Slight protrusion of the otherwise non-irritated bulb. Aqueous clear. Counts fingers. Mononuclear leucocytes 39.0%. Progressive irido-cyclitis set in with decided decrease in pressure. Mononuclears vary from 30.0% to 45.0%.

April 2d. Mononuclears 44.4%. Enucleation. No spirilla found in bulbar contents, which were bacteriologically negative.

April 4th. Rapid decrease of mononuclear leucocytes (30.2%).

April 6th. Blood picture absolutely normal.

Average count: Leucocytes 12,200; polynuclears 60%; mononuclears 40%.

Case 5.—R. D., 22 years, March 14, '10. Perforating injury of left eye by iron splinter. Triangular wound of the cornea with slightly infiltrated edges. Iris torn and lens swollen. Moderate iritis. Central light perception in one metre. Nasal projection lacking. Extraction of the foreign body with the giant magnet through the corneal

wound. Excision of iris prolapse. Mononuclear leucocytes 20.0%.

March 15th. In spite of only moderate signs of irritation, mononuclear leucocytes 37.7%. From then on, with only moderate irritation, they varied from 31.8% to 40.1%.

April 6th. Moderate irido-cyclitis without exudate. T—1. Projection false. Exenteration. No spirilla or bacteria in bulbar contents.

April 8th. Mononuclears normal in number.

Average count: Leucocytes 17,500; polynuclears 59.5%; mononuclears 40.5%.

CASE 6.—Private patient of Dr. G., 30 years. Perforating injury with steel wire. Smooth corneal wound with prolapse of iris and lens masses. Prompt excision of prolapse. Continued moderate irido-cyclitis. Eye remained more or less injected and was enucleated 42 days later because of continued irritation.

Blood count: Leucocytes 7,400; polynuclears 57.0%; mononuclears 43.0%.

Class B.

CASE 7.—B., 35 years. Perforating injury of left eye on January 31, 1910. Prolapse excision. Eye became amaurotic. Exenteration, February 5th. In the contents were found staphylococci and streptococci. Histological sections showed beginning panophthalmitis.

Blood count: Leucocytes 11,000; polynuclears 75.3%; mononuclears 24.7%.

CASE 8.—G., 77 years. Perforating injury of the left eye on January 19, 1910. Sideroscope and giant magnet negative. Enucleation, February 8th. Histological sections showed plastic irido-cyclitis and bulbar contents showed pneumococci and staphylococci.

Blood count: Leucocytes 13,200; polynuclears 74%; mononuclears 26%.

CASE 9.—P., 32 years. Perforating injury of the left eye on February 8, 1910. On admission, light perception in 10*cm* and projection false. Hemophthalmos. No signs of irido-cyclitis. On dismissal a month later, eye was pale and showed no signs of irido-cyclitis. Light perception in 5 metres and projection good.

Blood count: Leucocytes 6,200; polynuclears 71%; mononuclears 29%.

CASE 10.—K., 51 years. Perforating injury of left eye on January 10, 1910. Enucleation, January 13th. Eye

showed beginning purulent panophthalmitis. Streptococci found in bulbar contents.

Blood count: Leucocytes 13,800; polynuclears 80%; mononuclears 20%.

CASE 11.—S., 12 years. Perforating injury of right eye by exploding cartridge on February 3, 1910. February 8th, total prolapse of bulbar contents except a few remnants of choroid. Amaurosis. Bacteriologically negative. Discharged healed.

Blood count: Leucocytes 7,600; polynuclears 75%; mononuclears 25%.

CASE 12.—F., 19 years. Perforating injury of left eye by piece of stone on March 17, 1910. Two days later, combined removal of foreign body which stuck in the iris and iridectomy. Discharged March 27th, with pale eye.

Blood count: Leucocytes 11,800; polynuclears 74.5%; mononuclears 25.5%.

CASE 13.—L., 17 years. Perforating injury of right eye on February 22, 1910. Magnet extraction. Eye became pale and remained so. Discharged April 1st.

Blood count: Leucocytes 12,200; polynuclears 78%; mononuclears 22%.

CASE 14.—L., 25 years. Perforating injury of right eye on March 14, 1910.

March 17th. Iridectomy and extraction of foreign body. Panophthalmitis set in and eye was enucleated March 21st. Pneumococci were found in contents.

Blood count: Leucocytes 9,000; polynuclears 78%; mononuclears 22%.

CASE 15.—C., 25 years. Perforating injury of sclera on April 2, 1910. Wound sutured. Eye healed in 10 days with vision of 1.5.

Blood count: Leucocytes 12,500; polynuclears 74%; mononuclears 26%.

CASE 16.—L., 27 years. Old perforating injury and subsequent traumatic cataract. Simple flap extraction. Healing normal and rapid.

Blood count: Leucocytes 10,000; polynuclears 76%; mononuclears 24%.

CASE 17.—W., 15 years. Perforating injury on April 6, 1910. Extraction of foreign body and iridectomy. No iritis or cyclitis. Rapid and complete healing.

Blood count: Leucocytes 16,750; polynuclears 75%; mononuclears 25%.

Class C.

CASE 18.—P., 65 years. Irido-cyclitis e causa ignota,

oc. utr., since April 23, 1910. Complicated with bilateral cataract and subsequent bilateral iridectomy. Bacteriologically negative.

Blood count: Leucocytes 8,600; polynuclears 76%; mononuclears 24%.

CASE 19.—S., 16 years. Keratitis parenchymatosa cum iritis e lues heredit. oc., utr.

Blood count: Leucocytes 10,200; polynuclears 74%; mononuclears 26%.

CASE 20.—B., 75 years. Acute iritis post extractionem cataractæ senilis. Bacteriologically negative. Healed rapidly with seclusio pupillæ. Later iridectomy with good vision. Inflammation healed rapidly Blood always normal even after operation.

Blood count: Leucocytes 10,200; polynuclears 80.5%; mononuclears 19.5%.

CASE 21.—E., 20 years. Irido-cyclitis chronica oc. dext. e causa ignota.

Blood count: Leucocytes 9,000; polynuclears 73%; mononuclears 27%.

CASE 22.—P., 69 years, March 4, 1910. Simple flap extraction of left eye with subsequent iris prolapse. Next day, reposition of iris with peripheral excision. Subsequent irritation rather severe, with pin-point infiltrates at the corneal edge. Bacteriologically negative. Increasing exudation into the anterior chamber with decided plastic iritis which healed rapidly with occlusio pupillæ.

April 1, 1910. Eye pale. Light perception and projection normal. April 11th, iridectomy without subsequent irritation. Discharged with opacities of the vitreous and ability to count fingers in 6 metres.

Blood count: Leucocytes 10,800; polynuclears 78%; mononuclears 22%.

CASE 23.—A. J., 63 years, March 10, 1910. Simple flap extraction of both eyes. Some blood in the chamber. No irritation at first. From March 18th on, small hypopyon of both eyes. Bacteriologically negative.

March 19th: Leucocytes 6,600; polynuclears 70%; mononuclears 30%.

April 3d. Iritis healed. A few precipitates on Descemet's membrane.

April 13th. Discharged with partial closure of the pupil, but with good vision.

CASE 24.—M., 40 years. Mild iritis e causa ignota.

Blood count: Leucocytes 12,500; polynuclears 76%; mononuclears 24%.

CASE 25.—H., 45 years. Chronic tubercular iritis. Five months' duration.

Blood count: Leucocytes 11,750; polynuclears 76%; mononuclears 24%.

CASE 26.—K., 30 years. Acute irido-cyclitis e causa ignota.

Blood count: Leucocytes 13,500; polynuclears 72%; mononuclears 28%.

CASE 27.—B., 50 years. Acute irido-cyclitis e causa ignota.

Blood count: Leucocytes 11,500; polynuclears 73%; mononuclears 27%.

CASE 28.—V., 26 years. Keratitis parenchymatosa e lues heredit. cum iritis acuta, oc. utr.

Blood count: Leucocytes 11,750; polynuclears 74%; mononuclears 26%.

CASE 29.—T., 64 years: Acute irido-cyclitis e causa ignota.

Blood count: Leucocytes 12,000; polynuclears 74%; mononuclears 26%.

CASE 30.—R., 60 years. Acute irido-cyclitis luetica.

Blood count: Leucocytes 7,500; polynuclears 73%; mononuclears 27%.

As can be seen from the description of the cases, Class A consists of perforating injuries with subsequent irido-cyclitis and hence danger of sympathetic ophthalmia. Class B are perforating injuries both traumatic and operative, in which there was practically no danger of sympathetic ophthalmia clinically. Class C contains cases of irido-cyclitis of non-traumatic origin which could not lead to sympathetic ophthalmia. In the latter two classes, the blood was normal except for a slight leucocytosis. But in the first class, there was a uniform increase of from 20% to 80% in the mononuclears and a corresponding decrease in the polynuclears, as well as a slight leucocytosis.

The increase in the mononuclears is almost entirely limited to the small lymphocytes, although the large lymphocytes share to a slight extent in the rise. The large mononuclears remain unchanged. Among the polynuclears, the main change is in the neutrophiles which are very markedly decreased. The eosinophiles may or may not be increased, thus further decreasing the neutrophiles, but they are never patho-

logically high (never over 4% of the total leucocytes). The basophiles remain normal. I have not been able to find any relationship between the absolute number of leucocytes and the absolute number of the various kinds of white cells. As normal, I have accepted the figures given by Professor Jaksch in his text-book:

Neutrophiles 70–72%; eosinophiles 2–4%; basophiles 0.5%; large mononuclears 1%; small mononuclears 22–25%.

Could this lymphocytosis be due to other conditions than those existing in the eye? The patients were afebrile in all instances and in the one case where I suspected general tuberculosis (Case 1), an examination at the internal clinic of Professor Jaksch reported the patient to be perfectly normal. The blood examinations were made at the same time each day (10.30 A.M.), thus excluding the changes relative to varying meal-times, etc. The patients were all living at the clinic under practically the same conditions as regards diet, exercise, bowels, etc. Again, after operation, the blood count of the cases of Class A dropped to normal within a short time and remained there. The following table is an abbreviated record of Case 1 (as typical of the other five) before and after operation:

Date	Polynuclears	Mononuclears
Dec. 29	63.2%	36.8%
Jan. 2	65.2%	34.8%
Jan. 3	61.5%	38.5%
	Eye Enucleated	
Jan. 4	75.2%	24.8%
Jan. 7	75.4%	24.6%

One blood count is not sufficient. A daily count must be made and the variations watched. *A decided increase in the mononuclears has its significance*, provided other constitutional influences can be excluded.

On the strength of the above records can it be definitely stated that in cases of perforating injury of the eye an increase in the mononuclear elements of the blood at the cost of the

polynuclear elements is significant of a malignant course? For only in cases of non-traumatic irido-cyclitis or perforating injury without irido-cyclitis did I find the lymphocytes practically normal in number. If these blood findings are confirmed in a larger series of observations, a differential blood count will be of great importance in the prognosis of perforating injuries and the decision when to enucleate.

I wish to thank Professor Elschnig, the Chief of the Clinic, for the use of the clinical material and especially for his kind and deep interest in my work.[1]

[1] In the discussion before the Heidelberg Society, Dr. Wolfrum of Leipsic reported two cases of traumatic irido-cyclitis with clinically malignant course and with a marked lymphocytosis (up to 63% of the total leucocytes). In two other cases with benign course, the blood was normal. Dr. H. Gradle of Chicago also mentioned, beside the positive case herein reported (Case 6), a negative instance ending in perfect recovery after an alarming course with normal blood count.

SUCCESSFUL REMOVAL OF A PIECE OF IRON FROM THE VITREOUS.

By Dr. WALKER N. SHARP, Indianapolis, Ind.

On March 1, 1910, Paul M. S., 18 years old, while chiselling an iron newel post, was struck in the left eye by a flying splinter of iron, probably from the post. It took an upward and inward course, punctured the cornea and iris a few millimetres from the internal margin and nearly central vertically, escaped the lens, passed through the ligament, and lodged in the coats of the upper and inner portion of the globe.

I saw the patient about an hour after the accident. The conjunctiva was somewhat congested, the pupil was small and irregular, and the wound in the cornea could only be seen upon close inspection, while that of the iris looked like a streak of pigment turned outward, which was at first mistaken for the foreign body. Aside from a faintness immediately following the accident, no pain was experienced.

Ophthalmoscopic examination revealed a wound in the choroid in direct line with the course of the body. About this wound were three bright metallic-looking spots, probably bubbles. There was some hemorrhage and much exudation over the right half of the fundus. The lens was perfectly clear and vision was $\frac{1}{3}\frac{5}{5}$. The foreign body could not be seen. On consultation with Dr. Hood we tried the large and small magnets with negative result. We concluded to let the case rest. With atropin and rest in bed, the irritation subsided in a few days.

On the twelfth inst. two X-ray plates were made which showed the body resting in the coats at the point indicated by the ophthalmoscope.

On the 18th inst., the patient was discharged from the hospital but was kept under close observation. Vision $\frac{1}{2}\frac{5}{0}$. The lens was clear, and but few floating masses of

exudate in the vitreous. The foreign body was still not visible.

In May the boy returned to work, but had worked only a few days when he noticed that the vision was becoming dim. He returned to me on May 17th, with this complaint. I had not seen him for about two weeks. On further examination, I found that the foreign body had become dislocated, had dropped into the vitreous, and was seen lying low down behind the lens at the inner portion. Vision $\frac{1}{10}$. Another X-ray examination was made which showed the body in this location.

On the following day, at St. Vincent's Hospital, I extracted the body in the following manner: After thoroughly washing the sac, a solution of adrenalin with 4% cocain was dropped in. The eye was caused to rotate outwards, and a Graefe knife was pushed into the vitreous, the back of the blade outward, through the belly of the internal rectus, in a direction slightly downward and backward. On withdrawing the knife, pressure was made with the cutting edge to enlarge the wound. The edges of the wound were separated with a forceps, and a steel rod, made from the handle of a dental instrument, was pushed in to the point where the foreign body rested. The large magnet was brought in contact with the outer end of the rod and the current turned on. The rod was gently withdrawn, but the body remained in the eye. The Johnson magnet was then used, and the iron was gently teased out. The piece of iron was shaped much like an Indian arrow head, and was 4*mm* long, 2½*mm* wide, and 1*mm* thick. Not a drop of vitreous or blood was lost, and the wound healed very readily. The lens is still clear with very little exudate in the vitreous. The pupil has attained its normal size and vision is $\frac{1}{8}$. There is, however, as there has been since the injury, a partial scotoma of the left temporal region.

I entered the inner portion of the eyeball because the foreign body lay internal to the median line, and that portion of the choroid and retina was already wounded by its entrance. I went through the belly of the muscle to prevent bulging of the sclera by protection of the muscle fibres. I also reasoned that less vitreous would be lost, which proved true, as I lost none whatever. Had I attempted to extract the iron by way of the anterior chamber, I would undoubtedly have produced a cataract, torn the ligament and iris, and finally would have been obliged to make a section of the cornea, when

prolapse of the iris and other complications might have occurred. As it was, these portions of the globe are in their normal relation to one another and nearly normal vision is preserved.

STUDIES ON THE PUPIL.

By Prof. Dr. HUMMELSHEIM, Bonn.

Translated from Vol. LVII., No. 1, German Edition of these Archives, by Dr. Percy Fridenberg, New York.

I.—The Question of Concentric Contraction of the Pupil.

THE propounding of this question hardly requires to be justified. Even if the refracting surfaces of the dioptric system of the eye presented a uniformly spherical curvature, it would be by no means immaterial whether the narrowing of the pupil in meiosis takes place concentrically or whether, on the other hand, the centre of the pupil alters its position when the iris contracts.

As a matter of fact, however, the conditions of curvature of that component of the dioptric system which for obvious reasons has been most thoroughly studied, namely the corneal, are decidedly complicated. It is only in a small central area, some 4*mm* in diameter, that we find an approximately spherical doming which flattens decidedly, and irregularly in different directions, toward the periphery. Furthermore, this area is not disposed concentrically in relation to the visual axis, so that its comparatively regular curvature does not offer equal advantages to rays of light entering the eye at various angles, except when the pupil is very small. While these optical facts indicate the importance of determining what light rays are cut off by the contracting pupil of a "normal" eye, a study of the course of the light rays in the astigmatic eye, particularly in the act of accommodation which

is associated with pupillary contraction, absolutely requires a preliminary investigation on the mechanism of meiosis.

The following attempt to answer this question experimentally is accordingly in the nature of a preliminary investigation which may serve as a basis for further research. For this purpose I have made use of an apparatus designed but not yet published by Prof. C. Hess, who kindly demonstrated it to me at the Wuerzburg Eye Clinic.

The arrangement of this simple instrument is as follows:

A horizontal metal bar, of triangular section, resting on two supports, carries two carriers, each of which has a small frame to hold a cover-glass. These frames can be rotated about a vertical axis and can be raised or lowered by cog-wheels. The subject to be examined sits at one long side of the table, with the head supported by a chin rest, and the observer is seated opposite to him. One of the cover-glasses is placed between them but turned at an angle of 45° to a line connecting the visual axes of the two persons, so as to reflect an image of a small scale attached to the other cover-glass. The image of this scale appears exactly in the pupillary plane when both cover-glasses are equally distant from one another, and the diagonally turned glass is at the same distance from the pupillary plane of the person to be examined. The scale is illuminated by a miniature incandescent lamp which is shaded in all other directions and can be regulated by a rheostat.

One hundred and thirty eyes of 70 individuals were examined with this apparatus; the table being placed at an angle with the window so as to do away with any corneal reflexes. As a measure I first made use of a simple or cross scale and concentric circles, but it was found impossible to read off with sufficient rapidity, especially in case of a dark iris.

A more practical object was found in small white disks which were pasted or painted on the glass. A perfectly sharp outline can be secured by etching a circle on the cover-glass and letting a small drop of color fall inside it. The image of the disk appears very sharply and distinctly in the pupillary area and can be easily and rapidly centred in relation to the margin of the iris. If the pupil con-

tracts or expands we can now determine at once and accurately whether it has remained concentric with the disk image. Disks of various sizes have, of course, to be used according to the size of the pupil in each case; diameters of *2*, 3, and 4*mm* were found sufficient for our purpose. In order to insure absolute fixation, one eye is covered while the other looks steadily into that of the examiner across the table, whose head is also supported by a chin rest and kept fixed. It is advisable to begin with the least possible illumination, darkening the room until the pupil and iris can just be distinguished from each other at the upper margin. The image of the disk scale is then brought into place and illuminated. The daylight is then allowed to enter. The degree to which the room is darkened will of course depend largely on the color of the iris, so that juvenile eyes with light irides and "absolutely" large pupils offer the best conditions for this examination. Most of my subjects were, accordingly, children, although some were as old as 70 years.

As adaptation to each variation of illumination takes place rapidly, the pupil tends to assume its physiological width, allowing a counter or checking test of the results obtained with contraction to light.

The result of my investigations was to show *that the pupil contracts and dilates concentrically*. This was the uniform and invariable finding in all 130 eyes. An occasional, apparent discrepancy was soon found to be due to imperfect fixation or involuntary movement of the examined eye, and could always be corrected, although not without some difficulty and at a cost of much patience. About a half-dozen subjects were found who could in no way be made sufficiently quiet and steady, and had to be excluded from the tests.

K. Grossmann ("The Mechanism of Accommodation in Man," *Brit. Med. Journ.*, Sept., 1903, p. 11) has come to quite a different conclusion. He says: "I have examined thousands of irides and found in the overwhelming majority of cases that the pupil during contraction moves noticeably inwards and upwards, less frequently inwards and downwards or simply inwards." Although my investigations, it is true, do not deal with thousands of eyes, they are sufficiently numerous to

establish the fact that as a rule, at least, the pupil contracts concentrically and that eccentric contraction must be counted as a rare exception. Grossmann shows drawings of marked displacement of the pupil of astigmatic eyes during contraction and has recourse to this observation to explain the change of axis of astigmatism during accommodation noted by him in the same series of investigations.

Among the subjects examined by me there were several with astigmatic eyes, one with marked unilateral astigmatism, who, it is true, showed no change of axis during accommodation, but in these eyes, too, as stated, the pupillary contraction did not vary from the normal concentric type.

TO ILLUSTRATE DR. MIZUO'S ARTICLE ON "A RARE FORM OF TERATOMA ORBITÆ (FŒTUS IN THE ORBIT, ORBITOPAGUS PARASITICUS.)"

FIG. 1.

FIG. 2.

A RARE FORM OF TERATOMA ORBITÆ (FŒTUS IN THE ORBIT, ORBITOPAGUS PARASITICUS).

By Dr. G. MIZUO, Osaka, Japan.

Translated from Vol. LXV., German Edition, by Dr. Matthias Lanckton Foster.

(*With eleven figures on Text-Plates XXIV.–XXIX.*)

AMONG the numerous kinds of tumors of the orbit, the dermoids are fairly rare, the teratomata much rarer. If we understand a teratoma to be a tumor that consists of derivates from two or three germinal layers, or contains organs and portions of the body, only five or six cases are to be found in literature, which have been extensively reviewed and indexed by v. Hippel. In this work Ahlfeld's case is described as follows:

> A buttock and a left lower extremity protruded from the left orbit of a large, well formed child. Below this place, reaching nearly to the left angle of the mouth, corresponding to the direction of the embryonal maxillo-orbital fissure, protruded a tumor of liver-like consistency. Beside the buttock was a little proboscis, similar to the nasal proboscis of the cyclops. The child was still more disfigured by a frontal encephalocele.

v. Ewetsky published a work on this subject in 1902, but unfortunately it is not accessible to me either in the original or in abstract.

Comparison of the different cases gives the following clinical and anatomical picture: The tumor is usually fairly large at birth, grows as rapidly as a carcinoma or sarcoma, and causes great exophthalmos. The child gener-

ally dies within a few weeks. The eyeball and optic nerve commonly are normal, they never take part in the origin of the tumor. The histologic construction of the tumor is from the most diverse elements. The true teratoma always consists of tissue elements from all three germinal layers of completely embryonic character.

v. Hippel discusses the pathogenesis and decides in favor of the blastomere theory. He says the formation of complete organs has been met with in no case. I wish therefore to report a very rare and unique case in which many parts of the body and organs were found with external preservation of body form. The tumor might be called a "teratoid fœtus of the orbit."

A male child, fifty-four days old, was brought to my clinic May 26, 1906. The history gave nothing special; the pregnancy ran a normal course; the child was born in the tenth month, labor normal. The mother had already had eleven normal children.

After birth a red injected transversely oval swelling of the conjunctiva was noticed in the palpebral fissure of the left eye. This swelling increased and soon protruded from the palpebral fissure; its length was *3cm*, its breadth *2cm*. A swelling appeared on the lower lid which in the course of half an hour reached the size of a small hen's egg; on the upper lid there was likewise a slight swelling which seemed to be produced by pressure from below. On the second day a physician removed the swelling of the fornix and conjunctiva with scissors. At the same time he punctured the lower lid and evacuated some cloudy watery fluid which reduced the size of the swelling. As the swelling grew large again he repeated the puncture after forty days and evacuated a brownish purulent fluid. The opening thus made did not close and ten days later, fifty days after birth, a little fœtal left foot protruded from it. The opening dilated and a tumor-like mass became extruded. The tumor now developed very rapidly, growing larger from day to day, so that after two days the mother brought the child to me and I found the following condition.

Size and nutrition normal. The face seemed rather paler than normal; no abnormalities on the body or head. The right eye was normal. Below the left eye was a rose-red tumor as large as a small fist, looking like a fœtus, covered with fine woolly hair (Figs. 1, 2, 3, 4, 6), with a pedicle

TO ILLUSTRATE DR. MIZUO'S ARTICLE ON "A RARE FORM OF TERATOMA ORBITÆ (FŒTUS IN THE ORBIT, ORBITOPAGUS PARASITICUS.)"

FIG. 3.

FIG. 4.

like an umbilical cord (Figs. 4 n, 6 n), which passed through the opening in the skin and the orbit to be attached in the deepest part of the latter. The length of the palpebral fissure of the left eye was 3*cm*, 1*cm* more than that of the right eye (Fig. 5). The skin of the upper and lower lids was somewhat relaxed and hanging (Figs. 1, 2, 5). The eyeball protruded a little and was displaced upward (Fig. 5), the movement of the eye downward markedly restricted. The left papilla was pale, showing a slight atrophy. The direct light reflex was somewhat slow, otherwise the eyeball presented no abnormalities; 1*cm* below the margin of the lower lid there was a crater-shaped opening, 3*cm* in diameter, with a serrated margin (Figs. 2, 4, 5), the inner surface of which was covered with granulation tissue. This aperture communicated with a large cavity in the orbit into which the finger tip could be introduced. The cavity was bounded below by the smooth surface of the lower wall of the orbit, which was displaced somewhat downward and outward as compared with that of the right eye. The entire orbital cavity appeared to be very deep and large as compared with the other. The deep part of the orbit was so filled with the large pedicle of the tumor (Figs. 4 n, 6 n, 9, 2) that its size could not be determined. Above, the cavity was bounded by the left eyeball, though it extended above it to the outer and inner sides.

The tumor itself had almost the perfect form of a fœtus. It measured from the top of the head, which resembled an acephalus, to the gluteal region 70*mm* (Figs. 6, 7, 2, 3). The diameter of the gluteal region was 80*mm* (Figs. 1, 3). With the exception of the head, the tumor had a very soft cherry-red skin with fine woolly hairs. Near the head were some fairly long hairs (Fig. 2). The sole of the foot had the usual furrows (Figs. 1, 7, 9). The head had no scalp and consisted of a fragile, yellowish-gray brain-like mass (Figs. 2, 3, 6); at its lower margin on each side were auricle-shaped elastic masses which were broken off during the examination. Below the head, on each side, was a conical elevation (Figs. 6, 2, 4) 15*mm* high, apparently rudimentary anterior extremities. The right arm (Figs. 2, 6, 3, 4) was better developed than the left. From the middle of the region corresponding to the abdomen came a cylindric pedicle resembling an umbilical cord, which had a vertical diameter of 20*mm*, and a horizontal diameter of 16*mm* (Figs. 4 n, 2, 9, 7, 6). This pale-gray pedicle passed beneath the left eye deep into the orbit, perhaps to the base of the skull. The surface of the upper part was covered with epithelium overlaid with a mass of cholesterin;

the deeper part was covered with a membrane. It felt as though composed of many elastic tubes. On the inner side of the pedicle was a fleshy mass as large as a bean, with a little irregular elevation in the middle, through the centre of which a probe could be passed upward (Fig. 9, Darmtractsöffnung). On the outer side was a little surface as large as the tip of the finger, resembling mucous membrane, with a slit-like aperture in the middle through which a probe could be introduced (Fig. 9).

Between the thighs at the lower end of the abdomen was a penis-like formation about 10*mm* long (Figs. 1, 3, 4, 6, 7, 9). Its apex was somewhat swollen and measured 8*mm* transversely by 7*mm* vertically in diameter. At the apex was a y-shaped opening. The buttocks and lower extremities were fairly well developed (Figs. 1, 2, 3, 4, 6, 7); the feet and soles could be clearly recognized. Both feet were well developed, 23*mm* long, with five toes and toe-nails. The great and second toes of the left foot were almost grown together (Figs. 4, 6). The first three toes of the right foot lay close together (Figs. 7, 9). A separation between the thigh and the leg could not be made out distinctly.

On the basis of the conditions just described I believe I may assume that this was a case of twins, and that the child was an autosite, the tumor a parasite.

I ordered the immediate admission of the child into the hospital. After admission the appetite decreased and the child became feverish. It was interesting to note that when it became feverish the body temperature of the fœtus also rose. The development of the teratoid fœtus was very rapid, so that its increase in size could be seen with the naked eye from day to day. (Figures 1–4 were taken at this time.) When the child moved its head the tumor turned here and there and a purulent fluid escaped from the aperture. My opinion was that the diphtheria-like covering of the pedicle was the consequence of the purulent inflammation and that this was the cause of the fever. Soon the child looked pretty weak. At the end of two days I found great changes in the teratoid fœtus. Its color, which had been cherry red as in the new-born, was dirty pale with violet spots (Fig. 7). In consequence of the torsions that the pedicle had undergone the nutrition of the fœtus was interfered with. The torsion of the pedicle took place while the child was asleep and was due to the growth and increasing weight of the tumor.

I operated on the child without anæsthesia because its condition was so bad. I ligated the pedicle in two places in order to avoid a large hemorrhage and then cut between

To Illustrate Dr. Mizuo's Article on "A Rare Form of Teratoma Orbitæ (Fœtus in the Orbit, Orbitopagus Parasiticus.)"

Fig. 5.

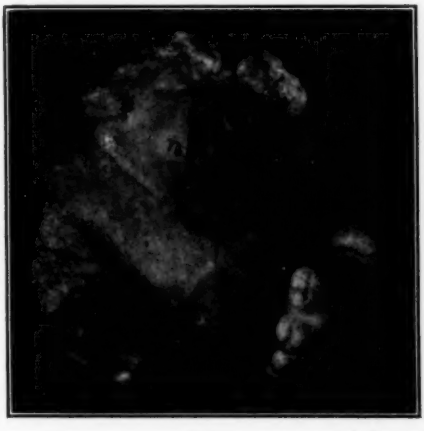

Fig. 6.

the ligatures; a slight venous hemorrhage from the fœtus followed. The child appeared to feel no pain. After the operation the fever dropped and the appetite improved. The sutures of the pedicle came away spontaneously five days later, but no hemorrhage followed, so I cut away the remaining portion of the pedicle. At this time the child was photographed again (Fig. 5). The crater-like aperture gradually became smaller so that at the end of two weeks, when the patient was discharged, it was of the size of the tip of the finger. Later I heard from the mother that the child had done well, the wound had closed, and the squint of the eye had almost disappeared. The child seemed to have some vision with the left eye.

Anatomical Study.

The weight of the excised tumor (Figs. 6, 7) was 68.3*gm.* After hardening in formol and alcohol I divided the tumor sagittally and took a piece 5*mm* broad from the left half for microscopic examination. By Roentgen photography of the halves of the tumor I could detect distinctly in each two ossified tubes in the region of the thigh. They ran parallel, close to each other as far as the ankle joint, 8–10*mm* long, 2*mm* broad (Figs. 10, 11). These were probably the two femora. The same photographs showed three or four ossified parts in the upper part of the vertebral column and about the mouth.

The cut surface of the divided tumor showed as follows (Figs. 7, 9): The cephalic portion consisted chiefly ot a brain-like mass; in one place there was a necrotic cavity, behind and below which was an oval, sharply defined formation with a little slit in the middle (Fig. 9, "Brain"), which resembled the cerebellum. In the region of the base of the skull were three cartilages, two of which were ossified. In addition there was a larger cartilage undergoing ossification. Beneath the latter was a hook-shaped, crooked cartilage, resembling the sacrum, the upper end of which was ossified (Figs. 7, 9). These four bones formed a row like a part of the vertebral column. Forward and downward from the base of the skull was a little irregular cavity with a longish, stomach-like space attached. The former cavity showed the microscopical characteristics of the throat, the latter those of the stomach. Below the stomach were two fairly large, transversely oval formations resembling lymphatic glands with large trunks of blood-vessels and nerves beside them. Above the sacrum and the adjoining bones lay two well-developed spinal ganglia united

by nerve-fibres. On the vertebræ, if I may call them so, were three little formations like lymphatic glands and many bundles of a transversely striated muscle. Large transversely striated muscle bundles extended from the head to the sacrum. Within the sacrum, as far as its apex, lay a small glandular mass from which some tubes arched to the end of the penis. The skin was fairly thick and particularly well developed. Most of the body had subcutaneous fat.

The microscopical examination of the portion of the pedicle excised later revealed the small and large intestine together with large blood-vessels and nerves, as well as loose, embryonal connective tissue. The condition may perhaps be considered as one of extroversion of the abdominal organs into the umbilical cord.

Microscopical Findings.

Head.—The brain-like mass consisted almost exclusively of a confusion of glia fibres and ganglion cells. It was very rich in blood-vessels having very thin walls and distended with blood. In many places in the vessel walls could be seen a fairly marked round-cell infiltration, particularly at the lower limit of the brain (Fig. 9, "Brain"). In the brain and in front of the cerebellum could be seen a small area of necrosis enveloped by demarking connective tissue. The cerebellum-like formation was defined with a fair degree of sharpness. In its middle lay a slit-like canal lined with a single layer of high cylindric epithelium. Capillaries radiated from this canal in all directions. The ganglion cells were particularly numerous in the cerebellum-like portion. The cartilages at the base of the skull consisted of hyaline cartilage and exhibited ossification in two places. The latter process was very regular, in some places bone medulla, bone trabeculæ, and Haversian canals could be seen. Below and forward from these bones of the base of the skull lay two or three cartilages about an irregularly defined cavity (Fig. 9 "Pharynx"). On the inner side of these cartilages were many tubular glands resembling salivary glands, which communicated with the throat through very long excretory ducts. The cavity was lined with a single layer of high, cylindric, ciliated epithelium, which extended without interruption into the mucous membrane of the stomach.

Body.—The vertebræ consisted of primordial cartilage in which ossification was far advanced. The Haversian canals and the medulla were fairly distinct. In the neigh-

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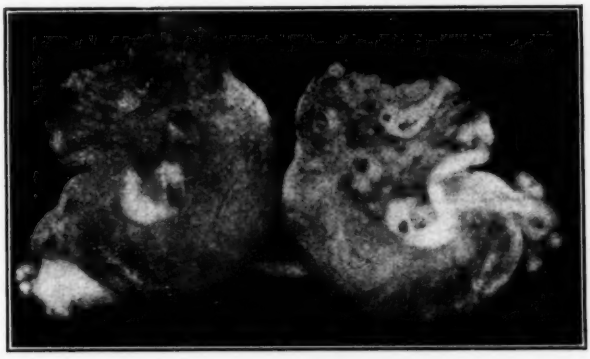

FIG. 7.

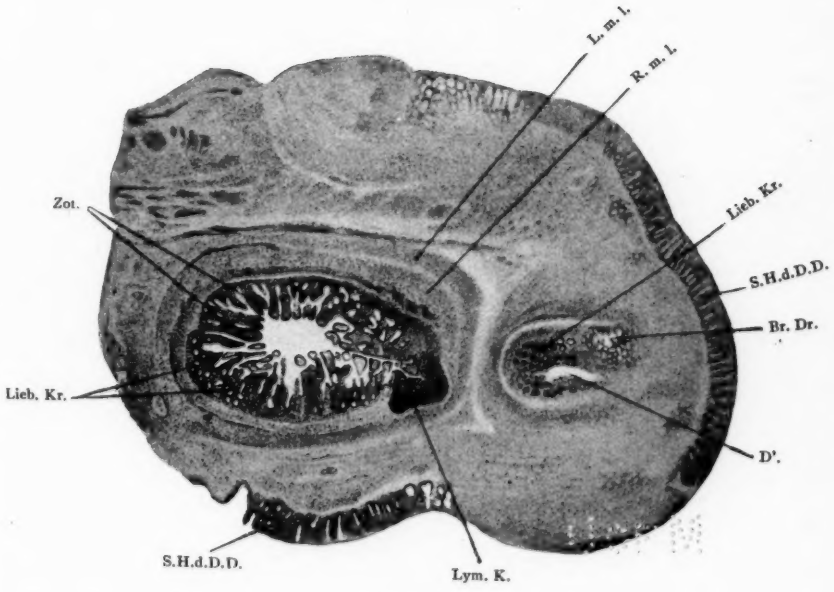

FIG. 8.

borhood were lymphatic glands, spinal ganglia, and many transversely striated muscle fibres, most of them attached to these bones. In the spinal ganglia were numerous well developed ganglion cells and nerve-fibres arising from them (Fig. 9, "Spinal-ganglia") which corresponded perfectly with the normal. In the sacrum the ossification began in the uppermost part. The glandular mass at the apex of the sacrum consisted of a tubular, very tortuous gland covered with a single layer of epithelium. Similar glands were present in the lower part of the pedicle at the mons veneris, and appeared to open in the central canal which led to the end of the penis. In front of the vertebræ were many large vessels, nerve trunks, and lymphatics.

Skin.—All parts of the skin were well developed, including the hair follicles, sebaceous glands, arrectores pilorum, and sweat glands. The subcutaneous cellular tissue was likewise very well developed, particularly the panniculus adiposus, to which the plump form of the tumor was due.

The Pedicle.—In the stomach the pylorus glands, the depressions in the mucous membrane, and the gastric glands could be made out very well. A formation like an embryonal pancreas could also be seen. The muscle layer of the stomach was well developed. By following the intestinal canal the duodenum and small intestine could be distinguished. In the duodenum the duodenal glands could be recognized. It, as well as the small intestine contained villi (Fig. 8, Zott), Lieberkuehn's glands (Fig. 8, Lieb. Kr.), and lymph follicles (Lym. K.). The muscle layer of the small intestine was completely formed; the muscularis mucosæ, the circular and longitudinal muscles, could be distinguished (Fig. 8, R. m. l. and L. m. l.). Between the two was the plexus mesentericus Auerbachii containing fairly distinct large ganglion cells. The small intestine was divided into two parts (Fig. 9); one part opened on the inner surface of the pedicle, and the mucous membrane at its mouth had the peculiarities of the mucous membrane of the colon (Fig. 8, S. H. d. D. D.), extended along the surface of the pedicle and formed what was noticed macroscopically as a fleshy mass. The other part opened below on the outer side of the pedicle somewhat later than the first. The extension of the mucous membrane was just the same as that given above. Between the intestinal canals ran some large vessels which carried blood to the fœtus, together with some large nerve trunks and lymphatics (Fig. 9).

The Glandular Masses.—Below the stomach transversely oval, fairly large masses resembling lymphatic glands could

be seen. One had a structure like that of the tissue of the spleen, it had many blood-vessels, and at its margin was a formation similar to the pulp of the spleen; the others, situated in front of the vertebræ, corresponded rather to true lymph glands. In front of the sacrum and above its apex was a tubular, tortuous gland; its lumen was lined with a single layer of high cylindric epithelium, the nuclei of which were displaced outward. This gland opened into the so-called ureter, and was thought by Hertwig, who was so good as to examine the preparation, possibly to be the urethral gland. Above the mons veneris and in the lower part of the pedicle were two peculiar glands, one of which, lying high in the abdomen, had a construction similar to that of the prostate containing here and there epithelial plugs and a colloid mass between the epithelial cells; the other, near the ureter, branched several times (Fig. 9) and was covered with a single layer of epithelial cells. We could not determine positively, but it seemed probable that this gland belonged to the ureter and represented the Wolffian body.

The urethra-like formation consisted of fairly large canals lined with a single layer of epithelium which ran from the region of the sacrum to the end of the penis. On each side of the latter were invaginations of the layer of epithelial cells, possibly indicative of the prepuce.

The development in this case was so great that the teratoma may be designated as a fœtus, or at least as a teratoid fœtus. When we compare it with the other reported cases we find Ahlfeld's approaches it the nearest. In his case there was an indication of an extremity, but according to the illustration this was incompletely developed. Nothing is given as to the relations between the tumor and the eyeball. The illustration leads us to suppose that the tumor was attached in the orbit at birth and that the child was either born dead or died shortly after birth, as it had a large frontal encephalocele and a large roundish tumor in the maxillo-orbital fissure. In my case the tumor was small at birth and occupied the orbit beneath the intact skin of the lid; on the fiftieth day after birth the tumor broke through the lid skin and then grew very rapidly on the left side of the child's face. After its removal the child developed and has remained well up to the present time. What organs were contained in the tumor in Ahlfeld's

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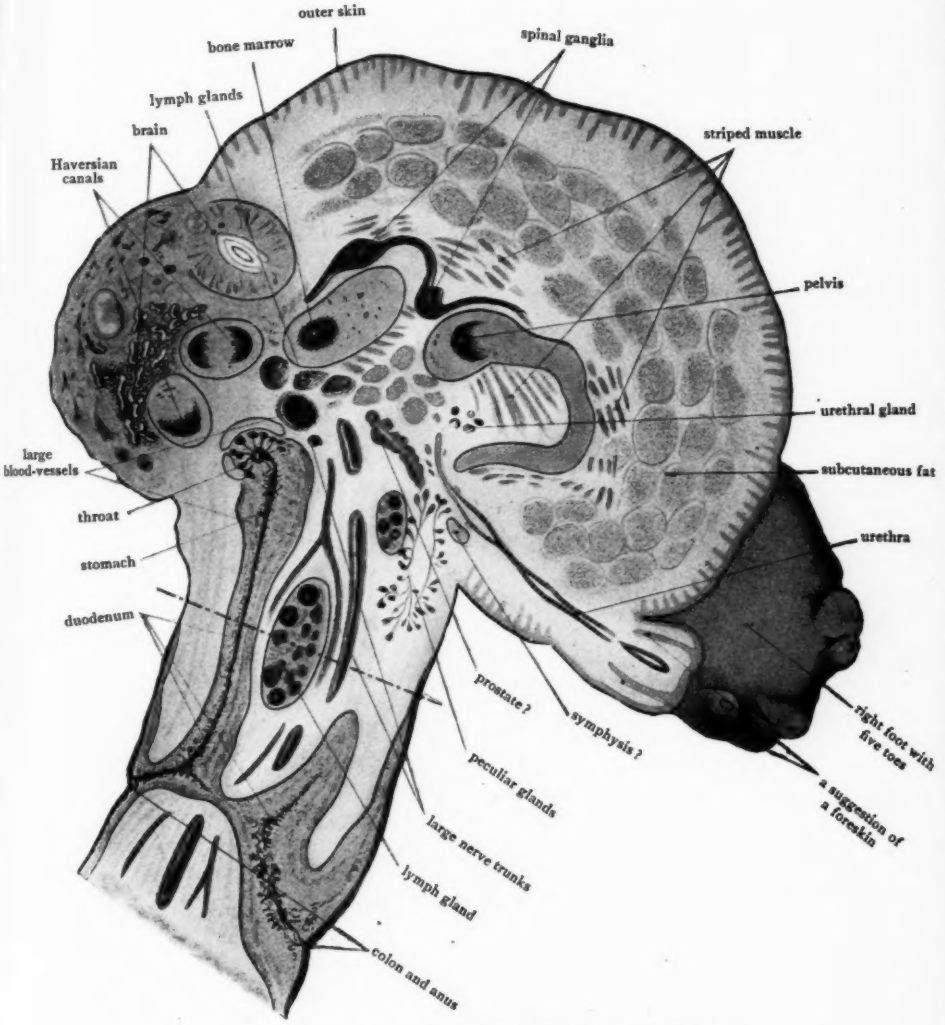

— · — · — · — · — · — · — Beneath this broken line the stalk is represented turned 90° to the right in order to show the anal opening.

FIG. 9.

case we do not know because he made no anatomical examination. "A little proboscis like the nasal proboscis of the cyclops" I would rather think an indication of a penis, as in my case, because such external genitals are usually very well formed in epignathous and epigastric monsters, in which the lower portion of the body is principally developed. Altogether Ahlfeld's case was too faultily developed to entitle it to the designation of a fœtus.

The famous case of Brōer and Weigert is much less characteristic than the last case or than mine. In it no formations were found that resembled a fœtus, or a part of one. The individual constituents were scattered about in the mass of the tumor. No central nervous system, nerve-fibres, or transversely striated muscle fibres were found. Yet in one place there was a rudimentary intestine. It presented a certain similarity to my case in that great quantities of fluid could be obtained here and there by puncture; Brōer and Weigert write that the growth was punctured and such a large quantity of clear fluid evacuated that the tumor collapsed to about half its size. In my case much yellowish fluid was evacuated by the two punctures.

In Brōer–Weigert's case the tumor contained very many cysts lined with epithelial cells and filled with ropy fluid, such as is almost always found in teratomata and mixed tumors. The great quantity of clear fluid evacuated at the operation came from one of the larger cysts. In my case, on the contrary, the tumor was solid and contained no cavities. The growth was in a large cavity filled with a yellowish fluid, hanging like an embryo in the amniotic fluid, and was fastened to the deepest part of the orbit by a pedicle like an umbilical cord. The wall of this cavity seemed to consist of a capsule-like connective-tissue membrane, the inner surface of which was smooth and covered with epithelium. The regular and symmetrical construction of the tumor was due mainly to this amnion-like space, yet the fluid and the increased pressure caused by it handicapped the growth of the tumor. The pressure within the cavity was reduced by the two punctures and rendered possible a rapid growth of the fœtus, so that finally the tumor broke through the lid skin and grew

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very rapidly within four days. I find mention of a similar cavity, of such importance for the development of the tumor, nowhere in the published accounts of malformations.

E. v. Hippel's case was much more complicated. He was able to demonstrate a rudimentary eye and the constituents of the central nervous system. The case was one of a retrobulbar tumor which had caused great exophthalmos in a child 5 years old and on account of which the orbit had been exenterated. It was composed of many constituents in addition to the two above mentioned, cysts filled with coagulated fluid, the walls of which presented epidermis and its derivatives, hyaline cartilage, bones, muscular and glandular tissue, follicles, etc., but all these constituents were scattered about and formed an ill-shaped tumor. Without doubt ganglion cells and medullated nerve-fibres, such as were present in my case, could not have been found.

In my case I could not make out a rudimentary eye macroscopically, but its presence is not excluded because I examined microscopically a section only 5*mm* thick from the middle of the tumor and retained the rest of the body as a macroscopic preparation. The other reported cases of orbital teratoma are so very incomplete in the description of the construction and outward form that they cannot be compared with my case. Courant's patient underwent exenteration of the orbit and lived. With the exception of this one and of my patient all the children with teratomata have died during the first few weeks of life, which shows that a timely operation under favorable conditions may effect a cure.

I believe it is not too much for me to claim that my case ranks first among all teratomata of the orbit as yet observed in preservation of the outward form, the presence of true organs together, and the almost normal topographical position of those organs.

Epicritical Remarks.

Without doubt this case was one of a highly developed teratoma of the orbit; but on the other hand it may be conceived to be a kind of asymmetric double formation in which the child was the autosite, the tumor the parasite. Formerly

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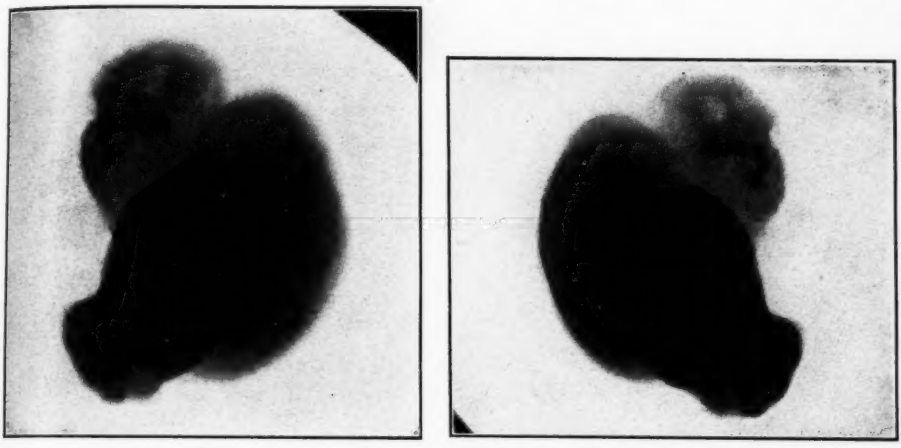

Fig. 10

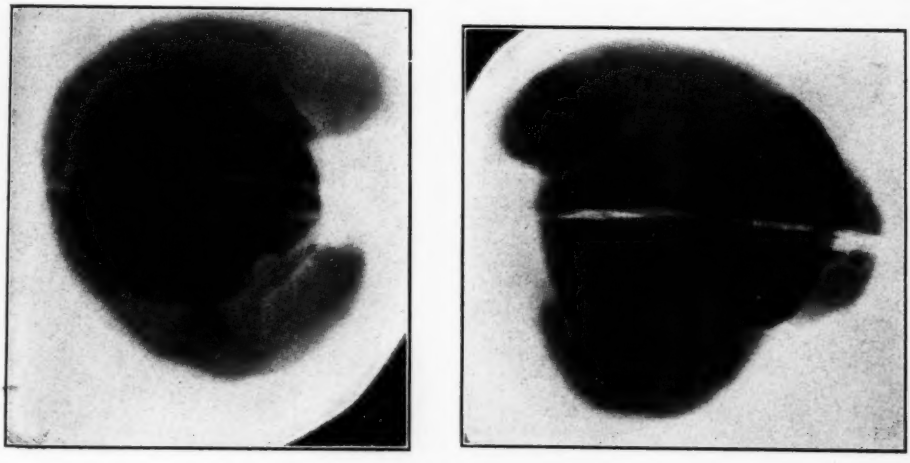

Fig. 11.

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it was difficult at times to make a sharp distinction between double and single formation, but the distinction is fairly easy if we follow Schwalbe's definition. He says: "We are accustomed to regard as a morphologically useful characteristic of double formation the behavior of the body axis. If the body axis is doubled in any case, we speak of a double formation; if only organs, or portions of the body which are without the body axis, fingers, toes, spleen, etc., are doubled, only a supernumerary formation is present." In my case the tumor was attached to the deepest part of the orbit or the base of the skull by a pedicle resembling an umbilical cord and, according to the above definition, it was an asymmetrical double formation.

The asymmetric double formations in which the parasite is attached to the head of the autosite are divided into four groups: 1, epignatus and related forms; 2, craniopagus parasiticus; 3, janus parasiticus; 4, dicephalus parasiticus. It is readily to be seen that my case would be classed in the first group, the epignatus, yet it differs from this considerably.

By epignatus is understood an asymmetric double formation in which the parasite is attached to the gums, or in the mouth in the neighborhood of the gums, of the autosite. Some forms not attached to the gums have been included in this class as related forms such as Schwalbe's, Bröer–Weigert's, and Ahlfeld's cases. Marchand takes a different view and designates these cases as prosopopagi. I incline to Marchand's view, because it seems more correct to differentiate double formations attached in the orbit from those attached to the gums. Still this name is not wholly satisfactory because Προσοπον means not orbit, but face. Bröer–Weigert's and Ahlfeld's tumors may properly be designated simply as teratomata, because only single organs were found in them, but the name teratoma is not so well suited to a complete asymmetric double formation with the parasite attached to the orbit; prosopopagus is not satisfactory, so I denominate this case of mine orbitopagus parasiticus.

It is interesting to compare the different observations of teratomata of the orbit with the degrees of epignatus. Schwalbe

divides these into four groups: 1, a second more or less developed fœtus is attached by an umbilical cord to the gums, or to a place in their neighborhood; 2, from the mouth hang parts which may be recognized as organs, or portions of the body of a second individual; 3, a formless mass protrudes from the mouth of a fœtus in which small, organ-like portions may be recognized. The microscopic picture corresponds with that of a teratoma; 4, a tumor on the gums, or in the mouth, proves on examination to be a mixed tumor composed of several kinds of tissue. In each of these groups there are gradations, transitions from more complicated to simpler formations, which affect the unity of the group. In this way an uninterrupted connection can be formed between epignatus, double formation, and teratoma, or mixed tumor. This connection forms the basis of a new theory of the pathogenesis of double formations and tumors to which many authors agree.

In an analogous manner and just as distinctly the double formations, teratomata, and mixed tumors of the orbit can be divided into four groups with transition forms: 1, a fœtus implanted in the orbit with an umbilical cord (my own case); 2, portions of the body of a second fœtus hanging from the orbit (Ahlfeld's case); 3, a formless mass growing from the orbit, anatomically a teratoma, *i.e.*, a product of all three germinal layers without regular arrangement; 4, a congenital tumor in the orbit containing cysts, cartilage, etc., the composition of which corresponds to the type of the mixed tumor and is the product of two germinal layers. This uninterrupted connection between the orbitopagus and the mixed tumor of the orbit is certainly of interest in teratology.

The advance of experimental embryology and teratology has changed the views held concerning the pathogenesis of double formations and teratomata; many old theories have been discarded. Hence I shall discuss only the modified Marchand–Bonnet theory, which seems to me the most probable and best explanation of the pathogenesis of congenital tumors of the orbit. This theory assumes that a blastomere separated from its connection comes to lie in some place in the growing embryonal organism and either remains there quietly to develop after a period of latency,

or begins its own development in the early embryonal stage approximately at the same time as the normal organism.

If we begin with the stage of the fructified germinal cell the first cleavage of which results in two segmentation cells we find both of these cells totipotent, *i.e.*, each possesses in itself the capacity to become an entire normal organism. This totipotence of the blastomeres decreases with advancing segmentation and consequently at a certain stage a blastomere possesses no longer the capacity to become a normal organism, but yet may become a part of such. If we go still further, a separated cell or group of cells may perhaps have the capacity to produce tissue elements by self-differentiation which correspond histologically to the different germinal layers, but cannot form complete organs, and finally, when the separation of the germinal layers has reached a high degree of completeness, single cells by separation and inclusion may later form a mixed tumor which contains elements from two germinal layers. Schwalbe calls the latest period at which the origin of the malformation can be placed the "teratogenic terminations period," and concludes in regard to epignatus: "the more complicated the structure of the epignatus, the earlier in general is the teratogenic termination period to be placed." The possibility of a uniform explanation of the four different types of epignatus rests on the ascription of all to the separation of embryonal germ material. Only the time at which this takes place and the so caused unequal potency of the separated material determines whether an almost completely formed organism, a part of an organism, a teratoma, or a simple mixed tumor shall finally be produced (v. Hippel).

A uniform explanation of the four groups of congenital orbital tumors is furnished equally well by this theory, for the only difference is in the localization of the tumors, which agree in being joined to the base of the skull. We have then the right to assume my case, which showed almost complete totipotence, developed from a blastomere that had become separated at a very early period. The teratogenetic termination period must be placed in the stage when the blastomeres were not yet much segmented. Then this germ, perhaps after a certain period of latency, began to develop. v. Hippel

thinks the development of the tumor in his case began some weeks before birth. In my case the period of latency seems not to have been so long, because the bony orbit, which contained the tumor, was markedly dilated.

I think it may be assumed that simple congenital tumors, lipomata, fibromata, chondromata, etc., originate from germ material that has become separated very late. Three theories have been advanced concerning the pathogenesis of dermoid cysts of the orbit: 1, diplogenesis, through inclusion; 2, plastic heterotopia; 3, incarceration. The first theory, to which I incline, has been attacked by many authors, particularly Paul Broca and Lannelongue; it was usually employed for the explanation of teratoma. The second theory has only historical interest. The theory of incarceration has the most adherents. I believe that the dermoid cysts of the orbit usually arise from the incarceration of the skin in embryo, but I can find no ground for the belief that a dermoid cyst should not arise from germ material which has become separated very late and therefore possesses very little potency, able indeed to produce only skin.

There is a marked tendency recently to seek to explain the protogenesis of all tumors in this way. Whether this is correct or not I cannot say, but it is a support to the theory that here in the orbit we have found an uninterrupted connecting series between true double formation and simple tumor.

In 1906 v. Hippel reported a very interesting experiment: he triturated the head of a 12-day-old rabbit embryo as large as a pin-head and injected it into the vitreous of the right and the orbit of the left eye of a growing rabbit. Seven weeks later he found in the episclera of the left eye a very hard, sharply defined tumor as large as a hazel-nut, which contained microscopically various constituents, hyaline cartilage, bone, lymphatic tissue, ganglion cells, cystoid formations, etc. I think that the result of this experiment supports the theory of the blastomeres.

EXPLANATION OF THE PLATES.

FIG. 1.—The tumor photographed from behind. One sees the well developed gluteal region, both feet with toes, the soles of the feet, and the

penis. The skin of the child's left eyelid is swollen; the left eyeball is turned upward.

FIG. 2.—The tumor from the right side. The head, right arm, and umbilical cord of the tumor are visible. About the aperture in the skin is a wall-like swelling. The child's upper lid is considerably swollen.

FIG. 3.—The tumor from above. The body, buttock, head, penis, and limbs are to be seen.

FIG. 4.—The tumor drawn upward so as to show the umbilical cord (*n*). The right arm and the individual toes of the foot are distinct.

FIG. 5.—The child photographed after the operation. The aperture is to be seen through which the tumor was extruded. The left eye is turned upward and inward; the skin of the lid is swollen.

FIG. 6.—The extirpated tumor from in front. The brain mass without skin covering, both rudimentary arms, the cut surface of the umbilical cord (*n*)—with the cut surface of the stomach above—the mons veneris, the penis, the crooked lower limbs, all five toes with nails. With the exception of the brain, the soles of the feet, and the penis the entire surface of the tumor is covered with woolly hair.

FIG. 7.—The tumor cut sagittally, showing both cut surfaces. The details can be understood best by comparing this figure with Figure 9.

FIG. 8.—Transverse section of the umbilical cord. Zott—intestinal villi; Lym. K.—lymphatic glands; Lieb. Kr.—crypts of Lieberkuehn; Br. Dr.—Brunner's glands; D'.—the top of the curvature of the duodenal region; L. m. l.—longitudinal muscular layer: R. m. l.—Circular muscular layer; S. H. d. D. D.—mucous membrane of the colon.

FIG. 9.—Representation of individual parts of the tumor.

FIG. 10.—Lateral Roentgen photograph of each half. One sees in each lower limb two ossified hollow bones and ossified parts in the region of the base of the skull.

FIG. 11.—Roentgen photograph from above and below. The different bones can be seen as above.

REPORT OF THE TRANSACTIONS OF THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

By Mr. C. DEVEREUX MARSHALL.

An ordinary meeting of the Society was held at the Medical Society's rooms, Chandos Street, W., on Friday, July 8, 1910, Dr. G. A. Berry, President, in the chair.

Mr. E. A. Dorrell showed an unusual form of **cataract** and Mr. W. H. Jessop a new form of lamp.

Mr. Arnold Lawson showed two cases, one of which was an unusual variety of **macular hemorrhage.**

Mr. Eason exhibited a case showing **massive exudate in the choroid** and Mr. Inglis Taylor **tuberculous iritis** of severe type. Mr. Taylor raised the question of the efficacy of treatment by tuberculin. Mr. Treacher Collins said that when he used tuberculin in small and gradually increasing doses he did not get very good results, but recently he had had one very satisfactory case so treated. In one patient a nodule had disappeared from both eyes, and there had been no return. Mr. Lawford and Mr. Maitland Ramsey had found benefit from the use of tuberculin.

Dr. George Mackay read a note on an **interfascicular endothelioma of the choroid** situated at the optic disk. At the beginning of the year the patient had a momentary loss of power in his leg, and fell while smoking in the smoking-room. A fortnight later he fell while rising from his chair, and lost consciousness momentarily. A week later he discovered that weakness of vision was due to a defect in the right eye, a neurologist found nothing abnormal in his fundi, and ordered iodide of potassium and abstinence from tobacco and stimu-

lants. When Dr. Mackay saw him, he was a full-blooded man of 60 years of age, and was said to have had no cardiac trouble, nor kidney disease. There was no specific history. In his youth he had been noted for his feats of strength. His pupils reacted to light and to convergence, the right a little less than the left. The media were clear, and the tension normal. From his shooting experience, the patient knew his right eye had good sight until four years ago. Recently he had occasionally had a sensation as if a long hair was touching his eye, and he had also color sensations in the right eye. The left fundus was normal. The disk of the right eye presented a curious appearance, difficult to define until the pupil was dilated with homatropin. That showed the surface of the disk to be elevated by a tumor substance, with adherent vascularization. The veins disappeared in the disk substance. It was possibly a congenital abnormality. There was a narrow dark ring of pigment, especially toward the macular side. Iodide of potassium, which had been discontinued, was advised to be recommended, but a month later there was no appreciable alteration. He did not note any dimness of vision. In the test types, he missed those to the left of the midline. Dr. Berry then saw the patient, and confirmed the diagnosis, but desired to see him again in six weeks' time. In order to be safe, Mr. Collins was also asked to see him, and he said there was a new growth in the right eye, involving the optic nerve. Mr. Collins advised that the eye should be removed, and as soon as possible. Since the excision, the tumor was found to be a mixed spindle-celled and round-celled sarcoma, but extending only a short distance into its sheath. Mr. TREACHER COLLINS described the pathological appearances, and exhibited slides by means of the epidiascope.

Mr. J. R. LAWFORD read a further note on the case of **optic atrophy and oculo-motor palsy due to intracranial new growth.** The patient was a man 40 years of age, who died in St. Thomas's Hospital on May 7, 1910. There had been a gradually increased proptosis on both sides, and a large growth between the eyeball and the nasal bone on the right side. The tumor also appeared in the left temporal fossa, and the movements of the lower jaw became restricted. A new

growth developed in the roof of the mouth. A few weeks before death, the right cornea began to slough from exposure, and the right fifth nerve became almost completely paralyzed, showing how extensively it had spread. There was headache, and a low delirium followed by coma, which terminated fatally. Post-mortem the day after death showed that the growth had extended all over the skull and nasal cavity. The olfactory lobe and the optic nerve were involved. The specimen showed a large glistening tumor, lobulated, smooth on the surface, and covered by dura mater. Mr. Shattock examined the growth, and reported that it was a rapidly-growing chondroma. The vision began to fail twelve months before death. Mr. DOYNE and Mr. HEWKLEY discussed the case, and Mr. LAWFORD replied.

REPORT OF THE PROCEEDINGS OF THE SECTION ON OPHTHALMOLOGY OF THE BRITISH MEDICAL ASSOCIATION.

By Mr. N. BISHOP HARMAN.

LONDON MEETING, WEDNESDAY, JULY 27, 1910. MR. CHARLES HIGGENS, LONDON, PRESIDENT.

The President in his opening address reviewed the changes in the practice of ophthalmology that he had known during his experience of forty years. In some branches there could be no doubt that they had made great advances both in theory and practice, in others the advance if any was small.

Considering this second group he instanced the grave diseases of trachoma and glaucoma. Of the first we had learned something more of its histology and possibly of its pathology, but save for the fact that we had dropped the old name of "granular lids" or "ophthalmia" for the more classical name of trachoma, we had made no alteration in our practice regarding it that was worth the name. Of glaucoma it could be said we had learned a great deal of its pathology, but as regards its treatment he was sure that a "bad" iridectomy was now, as it was forty years ago, the very best and most successful operation; and by a "bad" iridectomy he means one that left a minute fragment of iris in the scar so that the wound never properly healed, but maintained constant leakage proportional to the tension of the eye. In other diseases, such as inflammation of the anterior uvea, we had little advance to record; these cases were as mysterious and intractable as ever; but he would not say much on this as the subject was to be considered in a set discussion of the Section. In diseases of the lachrymal apparatus the only improvement in methods he

could cite was the very general cessation of the practice of slitting up the canaliculi for every form of epiphora; it was a good change.

Their greatest advances had without doubt been in the realms of optical work. The treatment of squint had been revolutionized, correction of difficulties of vision was uppermost, and operations had become proportionately rare with the best results.

In quite recent years they had improved greatly in their methods of testing color vision, thanks largely to the labors of Dr. Edridge Green, but the matter was still the subject of enquiry, and it was without doubt a complicated one.

The establishment of the universal use of the metrical system of measuring lenses had been of the greatest value and convenience in practice; younger members of the profession could scarcely conceive the worries in fractional calculations they had escaped by the substitution of dioptries for inches. Again, they had gained much by improved and standardized test types. The appliances of their work had been improved by the universal use of electricity; it was a boon not to be forgotten.

Coming to operative measures particularly, he could not see very much change. To judge by the makers' catalogues it would seem that every man invented instruments of his own, but the essential tools of their craft remained unchanged. Graefe's knife, the keratome, forceps, and cystotome, were the basis of most modifications of cataract instruments. But in the introduction of the giant magnet of Haab there was a real gain, notwithstanding it was an appliance for hospital work rather than private practice.

In some fields of our labors there had been a recrudescence of old operations. Sclerotomy for glaucoma bid fair to be fashionable once more, but it was no new thing. Bader and himself had practised it by incision and by the use of trephines; they mostly did it to relieve tension in blinded eyes, and the effects were undoubtedly good; but the practice had been overlayed by the fashion for iridectomy. Again, removal of the lens in its capsule was an old operation. It was described in MacNamara's text-book, and then mentioned as

old; he did not favor the method himself, but he had practised it rather by way of accident than purposefully, and no harm had resulted; the human eye would withstand a lot of handling.

In the treatment of syphilitic affections, changes were observed; at one time the use of mercury was grossly excessive, then came the inevitable reaction, and its replacement by infinitesimal doses of potassium iodide; now their practice seemed to be rational and successful.

In local anæsthetics they had obtained a great gain: the contrast to operating with badly administered general anæsthetics and of former risks to post-anæsthetic vomiting, to their present invaluable cocain, was immense; it appeared to him to be the greatest advance of his time. Antiseptics had also done much for them, asepsis little, for the attainment of this in the conjunctiva was wellnigh impossible. Then in the objective diagnosis of refractive errors the substitution of retinoscopy for the use of the direct ophthalmoscopy had been invaluable; he remembered the time when such a master of the refraction ophthalmoscope as John Couper was not ashamed to spend hours over a few cases, which would occupy the surgeon of to-day but a few minutes.

One other point was worthy of remark, that was the enormous increase in the number of ophthalmic surgeons. In his early days there were but a handful in London, now there must be more than a hundred. He hoped competition would have no ill effect upon their work. In this connection he wished more power to the British Medical Association, and an increase of its efforts to prevent abuses both within and without the profession.

Dr. G. A. BERRY (Edinburgh) then opened a discussion on the **future of ocular therapeutics**, considering the prospects of advance in the use of local and general remedies.

The underlying idea of their discussion was an enquiry as to how far did our knowledge, our aspirations, and the directions given to our scientific knowledge and practical views of to-day indicate the direction in which any real advance may be expected to take place in the near or more remote future.

Practical therapeutics cannot be brought within the limits

of very definite rules; a great deal will always depend upon the individuality, the temperament, the judgment, and the resourcefulness of the medical man. Further, there is an equal variability in the toleration, vulnerability, and diathesis of each patient he is called upon to treat. It is even so in eye affections where diagnosis is so much more sure than in other branches of medicine.

The progress of science in physiology, pathology, and bacteriology, and also in chemistry and physics, is constantly affording new indications for treatment. And similar advances tend to explain the effects of therapy which have hitherto been empirical. Nevertheless it seems true that the main advances in treatment are those which clinical experience has established. Scientific discovery may lead to changes, but does not ensure that such new treatment shall be better than, or even as efficacious, as other methods which do not appear to comply with a more accurate knowledge of the pathology of a disease. Clinical experience can alone demonstrate utility or failure. Part of the reason for the failure of indications afforded by scientific observation is due to the difference of effects of the same interference whether it be upon normal or diseased tissues. Even laboratory experiments in antiseptics do not necessarily ensure effectiveness of that reagent that is presumably most sure; local tissue reaction introduces a complexity not recognizable in laboratory experiments. So with tonics, antitoxins, sera, vaccines, etc., for which there appear scientific indications; in these the inferences are complicated, and the outcome far from commensurate with expectations entertained. At the present our art lags behind our science; yet even with that our art advances slowly but surely, for with every successful assimilation of a scientific indication blind empiricism is reduced.

Excluding operative and optical treatment, he considered local and general treatment. Both are older than history. Local treatment was known to the Egyptians in earliest times, and general treatment flourished in India and China long before Hippocrates. In local remedies it is curious that many have continued in valued service even to-day, particularly for diseases now known to be microbic. Mydriatics, miotics,

local anæsthetics, analgesics, vaso-constrictors and vasodilators were of almost entirely recent introduction. Yet of these it cannot be said they are as local applications established on a basis that admits no difference in practice. Witness the abuse of mydriatics, and a too prolonged and too powerful application of local antiseptics. In the future he looked to the more general substitution of pure alkaloids for salts of these reagents. Still it is remarkable that corrosive sublimate, one of the oldest drugs in use, and boracic acid, the first of known antiseptics, should still be prime favorites. It seems likely that we shall discover selective antiseptics for particular micro-organisms; yet it is possible that the combining of different antiseptics may prove of real advantage, for these drugs have uses beyond their bactericidal power. Part of our difficulty in judging of these matters arises from our lack of knowledge as to how the tissues of the eye react to some of these infections when no treatment is given. If we knew something of this we might see how to aid and hasten nature's curative processes. Particularly do we need greater penetration and less general irritation by the antiseptics employed; and it is a need which may possibly be met. Ionization seems an approach in this direction, perhaps also subconjunctival injection, particularly as regards increased penetration.

Of the use of specific sera and vaccines he would not speak in detail as this fell to the province of the next speaker; but there were undoubted indications that these would prove of real value.

New methods for the increasing of the resisting powers of the tissues was a line upon which we might expect advance; heat and cold were valued by every one, paracentesis had received scientific justification. Of dionin he could not speak with much satisfaction.

Of other methods of local treatment, electricity, X-rays, radium, and massage required reference. As regards electricity he confessed the utmost scepticism as to any good having ever been done, in any eye affection whatever, by the use of either the continuous or interrupted electrical currents. And he did not think past experience foreshadowed future benefits.

Electrolysis had proved of service; something might be expected of iontophoresis. It was too soon to define the sphere of radium; but it seemed to be better and safer than the X-rays. But we need opportunity for forming an opinion as to its value and limitations.

Referring to general treatment, he noted a curious difference in its usage as compared with local treatment. Old local methods survive at least in simplified forms, but this cannot be said with equal truth of general treatment. Excessive purging, bleeding, blistering, the use of emetics, and the excessive use of mercury had all disappeared. Sweat cures were now rare; perhaps that was a pity, but they may return to favor.

For the future he anticipated the discovery of methods for the arrest of tuberculous lesions, perhaps of preventing them. Syphilis and cancer may conceivably yield to curative and prophylactic measures, and even alcoholism might be eliminated as a factor in disease. Maybe other disturbing influences will arise to fill the places of those overcome, but sufficient to the day is the evil thereof. Improvements in the treatment of glaucoma were to be anticipated; and he would fain hope for successful relief of detachment of the retina; even now they occasionally got some good from Deutschmann's method of double puncture. Brain surgery would possibly relieve them of many cases of optic atrophy.

Such were the possibilities that seemed to him to arise out of our present lines of advance; what else was in store for them who could say. Was it altogether inconceivable that cataract itself should be capable of prevention or at least of arrest?

Dr. J. W. H. Eyre (London) continued the discussion, taking up the consideration of **bacterial products.** He said scientific therapy depended upon accurate diagnosis; it was hopeless to expect improved methods of treatment without this as a basis. Take for example the well-known condition of ophthalmia neonatorum; this was not a specific entity, but one that depended on the infection of several organisms, the gonococcus, streptococci, staphylococci, and others. Clearly any specific treatment needed a particular diagnosis. There

were two groups of bacterial remedies, antitoxic sera and vaccines. He could not recognize local and general applications. What they did was to imitate nature so far as possible. Their methods were the outcome of observations of general disease produced experimentally, of a close study of the course of infection, and of the production of anti-bodies directed against the invading organism. Careful enquiry showed that anti-bodies were specific. Nature was very strict in her methods in these infections, and one anti-body would not serve against an alien organism. Hence the primary necessity for accurate diagnosis.

Serum therapy seems to have only a limited applicability. There was one undoubtedly valuable serum for diphtheria, and it was of value in diphtheritic conjunctivitis. Of other sera little good has come, at least in eye work. The anti-pneumococcic serum was not antitoxic but antibacterial; it had proved of some service, but in his experience pneumococcic affections of the eye were uncommon in England though more common on the Continent.

One of the difficulties of obtaining specific sera was the inability to immunize animals of sufficient size.

Vaccine therapy seemed to present a much more fruitful field. Its object was to provide a stimulus to the natural processes, to provoke the production of anti-bodies within the affected subject in larger quantities than were naturally formed. They obtained cultures of the invader, destroyed them by heat, standardized the preparation, and injected known quantities of the vaccine into parts of the body distant from the original infection. The reaction caused a local production of anti-bodies, which circulating throughout the body exerted a beneficial effect upon the distant lesion.

Of those most useful in eye work he would cite the old tuberculin of Koch, which they had only recently learned to use in a proper manner; staphylococcal and streptococcal vaccines had proved of great value in direct contrast to the inutility of the sera. Gonococcal vaccine had proved of value in iritis. The applicability of tuberculous vaccine was increasing, and he looked to it to afford a better means of treating tuberculous conjunctivitis than any surgical method.

Lastly he dealt with the relations of the ophthalmic surgeon to the bacteriologist. Harm was done by isolated individual action, for each failed in a knowledge of the other's line of work. To obtain the best results they must work hand in hand; the surgeon to observe the clinical aspects of the case, the bacteriologist to carry out the specific diagnosis and the indications for specific treatment.

Three papers pertinent to the discussion were then read as part of the discussion.

Mr. ARNOLD LAWSON and Dr. MACKENZIE DAVIDSON (London) read a paper on **radium therapy in ophthalmology.** They gave an account of an investigation into the possibility of radium as a therapeutic measure in external disease of the eye and eyelids. The mode of application and some indications gathered from their experience were given with regard to dosage, length of exposure, and frequency of sittings. The immediate and remote effects of exposure were discussed, and the results of treatment detailed (an extensive tabular summary of the cases treated was circulated). The report was of an encouraging nature and suggested in particular that corneal ulcers were amenable to this new agent. There seemed to them no doubt that spring catarrh was cured, whereas by any other treatment it had proved intractable.

Dr. H. M. TRAQUAIR (Edinburgh) read a paper on the **treatment of purulent keratitis by zinc iontophoresis.** The treatment was introduced by Wirz in 1908, for external eye disease. The principle underlying it was the carrying of minute fragments of the metal electrode into the tissue by means of the galvanic current. He demonstrated the apparatus used, and the general methods of anæsthesia and mydriasis adopted in the course of the treatment. Up to the present, 27 cases of corneal ulcer had been treated by him in this way and only those which were of so serious an order that ordinarily treatment would have been by means of the thermocautery. Film preparations and sometimes cultures were made from the ulcer to establish diagnosis. Twenty cases were typical ulcus serpens, the others were atypical. Of 20 investigated cases, 15 were pneumococcal. The cases treated were described in detail, and it was concluded that on the

average the treatment was more expeditious, and the vision regained after cure was superior to that obtained by the cautery. The method was not unduly painful, and the apparatus was convenient and simple.

Mr. N. BISHOP HARMAN and Dr. E. R. MORTON (London) read a paper on the **use of carbon-dioxide snow in eye work.** They pointed out the recentness of the use of this snow in surgery and the established place it had secured in the treatment of capillary nævus. Their communication related to its use in papilloma and rodent ulcer about the eyelids, and in trachoma. In the treatment of external new growth their experience had been one of great satisfaction. Large papilloma and rodent ulcers had yielded to single applications of the snow for 40 seconds. The application caused scarcely any pain and the after-reaction was not discomforting; the growth simply exfoliated and left clean healed surfaces almost indistinguishable from normal skin. In the treatment of trachoma brief and repeated applications were made, beginning with 15 seconds and gradually increasing to 30 seconds, once a week. They did not pretend to assert they had found any specific cure for a disease of so chronic and intractable a nature as trachoma; but they pointed out that in cases of six months' treatment fine scarring had been produced quite as readily as one could expect, and that the treatment was free from pain. The preparation of the snow was demonstrated to the Section on the succeeding day, cases treated were exhibited, and one of trachoma was treated with snow at the time.

In the general discussion on the subject for the day, Mr. ANGUS MACGILLIVRAY (Dundee) said he thought that Dr. Berry was rather inclined to be pessimistic of the prospects of advance. He regarded the advance in bacteriological methods of diagnosis of the highest promise, *e. g.*, in the case of corneal ulcer their action should be entirely determined by it; if the pneumococcus was found it was an indication for the immediate use of the cautery; but if the diplobacillus was the infecting organism then the cautery was injurious, and zinc became their sure weapon. Again, in conjunctivitis the finding of the Koch-Weeks bacillus indicated an inflamma-

tion that would speedily depart even without treatment; but the diplo-bacillus would keep up inflammation for long periods unless effectively treated with zinc.

Fibrolysin injection he had found of great service in reducing scars of old interstitial keratitis; in this he disagreed with Dr. Berry. But he was entirely in accord with him in his strictures on the us eof electric currents. The co-operation of bacteriologist and eye surgeon was likely to be of great value; but they should not hasten to discard all that the laboratory expert condemned, *e. g.*, he found argyrol of value in ophthalmia neonatorum notwithstanding its feeble bactericidal power.

Dr. R. A. REEVE (Toronto) held that the efficacy of dionin had not been fairly tested unless the powder itself was used in direct application after the use of cocain. In acute iritis with synechiæ solutions of dionin may prove useless, but the powder produced speedy and gratifying effects; they must not be afraid of a marked reaction, as the best results followed it. Again, he questioned the pessimistic view of electricity; high frequency currents had been of service to him in optic atrophy. Also fibrolysin injections had been followed by resolution of vitreous opacities responsible for detachment of the retina, with resultant improvement in field and acuteness of vision.

The PRESIDENT remarked on the use of electricity in early optic atrophy; he saw no justification in it; it was rather like flogging a dying horse.

Dr. G. S. RYERSON (Toronto) said he had had gratifying results in the use of radium in a case of epithelioma of the conjunctiva; these were cases that spread to the surrounding tissue, and incision did not secure cure without great loss to the tissues. Nævus of the lids also yielded readily to radium. He asked what activity of radium had been used by Mr. Lawson.

Mr. HILL GRIFFITH (Manchester) said he had had the most gratifying result from the use of tuberculin in cases of tuberculosis of ocular and palpebral conjunctiva; complete cures had been obtained.

Mr. A. W. ORMOND (London) referred to four cases of

tuberculous periostitis of the orbit in which there were proptosis of the eye and loss of vision. In all cases part of the mass had been excised and proved to be tuberculous. Tuberculin injections had been used with unvarying improvement of the conditions. In two cases complete cure had been obtained, and the other two were improving more slowly.

Mr. LESLIE PATON (London) said that in the treatment of detached retina it was important not only to get the retina back into place but to fix it there. To lack of this, methods that at one time promised fair were eventually disappointing. He recommended the use of the cautery for perforating the sclera and retina; and the attempt to draw the retina into the lips of the wound. This method presented an ideal means of sealing the retina to the scleral cicatrix.

Dr. C. MONTAGUE HARSTON (Hongkong) confirmed the beneficial effects of argyrol in 25% solutions in the treatment of ophthalmia neonatorum. The use of powdered dionin he considered too drastic; not only was the reaction severe, but there had been in one case he had seen a severe reaction of the patient against his doctor. He confirmed absolutely the conclusion of the President as to the uselessness of high frequency currents, or any other electrical current in optic atrophy. In one case, however, he had seen some success from intramuscular injections of succinimide of mercury, but it was rash to draw conclusions from one case.

Major H. GIDNEY, I.M.S., considered dionin of great value in corneal opacities; the chemosis it caused need not alarm one. Fibrolysin he considered after an extended trial useless. He emphasized the necessity of restricting the use of the cautery to the advancing edge of pneumococcal ulcers of the cornea, and leaving the central portions, which had been shown to be free of organisms, untouched.

Major G. H. FINK, I.M.S., commented upon the use of carbon dioxide when in solution in water; it had been proved by Hankin of Agra to be destructive of organisms.

Dr. G. A. BERRY, in reply, said he had been interested to hear of the use of carbon-dioxide snow; as a manager of the Edinburgh Infirmary, he looked upon new remedies from an economic point of view, and heavy expenses they had antici-

pated by the requirement of radium had been obviated by the advent of the snow.

Regarding the possibility of cure or retardation of optic atrophy, he believed that those cases in which improvement was believed to have been effected by treatment were really retrobulbar neuritis, and of the same order as those described by Graefe in 1850 as *amblyopia sine causa*.

Dr. MORTON replied to some questions concerning the use of carbon dioxide. As regards the sensations of the patient, they experienced at the moment of the application a slight burning feeling; there was more sensation at the time of thawing out, but neither of these sensations was discomforting.

MEETING OF THURSDAY, JULY 28, 1910. THE PRESIDENT OF THE SECTION, MR. CHARLES HIGGENS (LONDON), IN THE CHAIR.

The meeting commenced with a series of demonstrations:

Methods of testing color blindness: By Dr. F. EDRIDGE GREEN (London).

New **operation for the production of filtration cicatrix in chronic glaucoma:** By Dr. H. HERBERT, (Nottingham).

Use of new registering form of diaphgram test for measuring binocular vision: By Mr. N. BISHOP HARMAN (London).

Use of carbon-dioxide snow in the treatment of trachoma; By E. R. MORTON (London).

After which the discussion for the day was introduced by Mr. T. W. HOLMES SPICER (London), and Mr. STEPHEN MAYOU (London), on the **more chronic forms of anterior uveitis.** The extra-ocular manifestations were dealt with by Mr. Spicer.

He remarked it was curious that the same subject had been dealt with by Professor Fuchs, of Vienna, at the last London meeting of the Association. He would exclude the evanescent type of episcleritis described by Fuchs, and also pustules beginning in the conjunctiva, which were local affections, also gumma of the ciliary region spreading externally. That left him scleritis and episcleritis. Text-books distinguish between episcleritis and scleritis; there was no essential difference

between them, save the variation in incidence with the time of life, and the severity of the inflammation. So far as their connection with uveitis was concerned, that depended on the depth and intensity of the inflammation. He found two types of scleral nodules, one hard and raised, which on incision proved to be mostly solid, though occasionally a bead of pus was found within. The second type presented a boggy undermined condition; the surface was blue, soft, and yielding. Some cases began as a vesicular eruption. Considering sex and age incidence, he gave figures from 55 cases. Of these, 15, or 28%, were in males; 40, or 72%, females. The difference was striking. As to the liability of the eyes to inflammation, the right appeared most frequently affected, but he thought there was little in the observation. The decades of maximum incidence proved to be between 20 and 40 years, but in considering this, it had to be borne in mind that the duration of the cases was long—it might extend to 15 years. The features of corneal invasion were of interest; he noted the occurrence of crescentic areas of infiltration separated from the patch of scleritis by a band of clear cornea; these crescents had their concavity towards the limbus. When there were frequent attacks of scleritis in different parts of the eye, a complete ring of these small crescents might result, simulating arcus senilis. He thought they were due to obstructed lymph circulation in the cornea. He had observed similar crescents capping fascicular ulcers. The invasion of the inner parts of the eye was due to extension of the poison; cyclitis, iritis, and opacities of the cornea were evidence of the severity of the inflammation. Coming to ætiology, he found evidence of rheumatism in 24 of the cases, and a definite absence of it in 26. Indigestion and constipation and pyorrhœa alveolaris were exceedingly common in the affected eye, but were these not common in most hospital patients of this age and sex?

The preponderance of females suggested the possibility of disease peculiar to female organs; but the most careful examination of many cases brought no evidence of this. The most certain thing was that the subjects were young women of sedentary habits: milliners, dressmakers, and the like. Deal-

ing with pathological features, section of nodules showed no evidence of tubercle. Cultures were most often sterile. In one where the staphylococcus aureus was isolated, a vaccine was prepared, but it proved useless. von Pirquet's reaction was tried four times; two were positive, and two negative. In the positive cases, tuberculin injections were made. Both recovered, though no striking changes in the scleritis appeared after the injections. Three cases were examined for syphilis by the Wassermann test, and all were negative.

As regards treatment, he had excised nodules in nine cases, with varying results; on the whole, he thought well of it. He suggested incising the patch and touching it with carbolic acid. Injections of cyanide of mercury had proved useless. Iridectomy had been done for secondary causes; in one case the scleritis recurred four months later, in another not for several years. Hot vapor baths were very good during attacks, but did not prevent recurrence. It was too early to estimate the value of ionization; he found the reaction severe. It tended to increase the severity of the attack, but one case appeared to be improved. He was inclined to consider it too painful. Salicylic ionization seemed much more pleasant. In his opinion the disease was toxic, *i. e.*, not due to a local organism; and he based his opinion on the absence of organisms in the nodules. He thought it was a local thrombosis, something like a chilblain, not that it was a cold-weather disease, or that warmth was a great factor in relief. It was a toxic thrombosis, and possibly the manifestation of tubercle in other parts of the body; yet it was not limited to tubercle. At present they had no means of distinguishing these toxins.

Mr. STEPHEN MAYOU (London), dealing with the **intraocular manifestations of chronic anterior uveitis,** said he purposed considering the bacteriological aspect. He had investigated 38 cases. Of 30 where there was good evidence of the cause, tubercle accounted for 15, staphylococci for 10, and syphilis for 5. Apart from wound of the globe the infection must be by the blood stream, and from some other focus elsewhere in the body. That organisms caused uveitis directly had been demonstrated, but there is no evidence of toxins producing similar effects. Tuberculous affections of

the lungs and glands, pus infections of teeth, boils, and leucorrhœa, and possibly disease of the gut, were common foci. Chronic middle-ear disease had also been held responsible. He looked on these affections as a chronic pyæmia, and held that this accounted for the cachexia so common. All his septic cases had been in females. So far as they could distinguish the clinical symptoms, the character of the keratitis punctata varied with the organism. In staphylococcal and syphilitic cases it usually consisted of a cloud of fine dots, whilst in tubercle the spots were large and like mutton fat. This distinction was probably due to differences in agglutination.

The changes in the iris were essentially atrophic, following vascular sclerosis. The occurrence of cataract secondary to the inflammation was probably due to toxic effects upon the lens epithelium, and loss of protection from aqueous absorption. Choroiditis when anterior was probably due to spread of the disease; isolated patches posteriorly might be separate foci. The increase in tension sometimes noted was likely to be due to two causes: altered secretions, and altered osmosis through the diseased hyaloid. Low tension he found in one case due to the shrinkage of the vitreous. Iritis adhesions were less common with staphylococcal forms. Vitreous opacities were slight in tubercle, always present in syphilis, and most marked in staphylococcal. The determination rested however on specific tests. v. Pirquet's reaction was of doubtful value. Of the Wassermann reaction he had little experience as yet. The local reaction on the eye following injections of toxin into the blood was most valuable. In 48 hours there was increased ciliary injection, punctate keratitis, and vitreous opacity. The patient noticed the loss of vision. Choroidal patches became œdematous. Bacteriological examination of the aqueous was the only certain process. Smear preparations were no use. Inoculation of the aqueous into animals would alone give positive results with tubercle. Inoculation of the aqueous on to blood serum was sufficient in staphylococcal cases. As regards treatment, paracentesis had been established as a most beneficial measure; it allowed the site of the lesion to be drained, and then flooded with blood

serum containing protective bodies. He did not hesitate to repeat the operation.

Vaccine treatment he found of great value: and whenever possible the vaccine was prepared from the patient's own organism.

The PRESIDENT said it did not appear they had made much advance as regards treatment with the exception of the tentative use of vaccines. He confirmed Mr. Spicer's observations as to the peculiar corneal marking left after scleritis. In his experience irido-cyclitis and kerato-iritis were much more common in young women and in hospital cases. In six recent private cases four had given a positive Wassermann reaction, and one other he thought syphilitic.

Mr. A. W. ORMOND (London) said the possible causes of irido-cyclitis were almost numberless; syphilis—acquired and inherited,—gonorrhœa, rheumatism, tubercle, malaria, leprosy, dental caries and Bright's disease were well recognized causes. In other cases the cause was not discoverable. Ramsey had suggested that faulty metabolism was at the basis of them, and he thought auto-intoxication from the gut might have a determining influence. It was, however, more likely the affection was due to organisms acting directly than toxins acting from a distant focus. In this connection the examination of the blood was important. In three recent cases of sympathetic ophthalmia this had been done by Dr. Price Jones. There was a tremendous increase in the percentage of mononuclear leucocytes. It reached 16% to 20% instead of the average 2 to 4%. This suggested a protozoal infection and not a bacillary one.

In treatment of irido-cyclitis he strongly urged paracentesis and irrigation of the anterior chamber with normal saline solution.

Dr. W. H. BRAILEY (Brighton) quoted a case of uniocular irido-cyclitis which was probably due to the sting of an insect on the side of the nose. He commented on the difficulty in obtaining certain evidence of rheumatism, and the fallacies of statistics as indicative of the prevalence of any chronic disorder in males and females, owing to the fact that men did not trouble so much about these conditions.

Dr. R. A. REEVE (Toronto) commented upon a case of **homolateral irido-cyclitis consequent of follicular tonsillitis.** First one side of the throat was affected and the corresponding eye; later the other side of the throat and the other eye. He had frequently noted correspondence of tonsillar affections with the eye inflammation.

Mr. HILL GRIFFITH (Manchester) said that when using the cautery in cases of scleritis he had found pus in some of the nodules; he thought solid nodules were rare. Commenting on the peculiar corneal scars left in scleritis, he asked if they were analogous to the white corneal lines so frequently seen in dermoid of the limbus. In some cases the interval between the attack of the two eyes extended to many years. He noted that Mr. Mayou accepted the explanation of the occurrence of keratitis with solitary patches of choroiditis he had put forward some 23 years ago.

Dr. G. A. BERRY (Edinburgh) said the proof of toxic origins of inflammation was much more difficult than the detection of the presence of organisms, and this should have some influence in our judgment of difficult cases. He thought that tuberculous irido-cyclitis had many features in common with sympathetic ophthalmia; the latter might almost be analogous to a malignant form of the former.

As regards staphylococcal infections, he was strongly of the opinion that the soil in which these were found as apparently causal agents was prepared by tuberculous infections elsewhere. He agreed in the preponderance of cases in women, but he would put the percentage as high as 90%.

Mr. N. BISHOP HARMAN (London) said that with the aid of Dr. Bernstein he had investigated a large number of eye cases by Wassermann reaction. He was much impressed by its reliability. Citing the case of a large family of which only two members remained, both these women suffered from forms of chronic uveitis; one had scleritis during 20 years, the other posterior inflammation. With the introduction of the test they were each examined twice and gave a positive reaction. Another woman with granuloma of each iris and the "mutton fat" variety of punctate keratitis, had been thought to be tuberculous, but the Wassermann reaction was positive, and

mercurial treatment proved much more beneficial than tonics. It must be borne in mind that the test only signified a general taint; it did not prove that a given lesion was syphilitic; for this, the test must be standardized. His experience of paracentesis was most happy, and in this connection it was of great interest to read the ancient experiences of Wardrop.

Dr. CECIL SHAW (Belfast) expressed his approval of Mr. Spicer's views that many of the cases of sclero-keratitis were toxic. He had been struck with the number of patients who seemed otherwise healthy, but who led sedentary lives without sufficient open-air exercise, *e. g.*, domestic servants. As regards foci of infection in uveal inflammation he thought the nose should be carefully examined, as it was probably a frequent source of septic infection. Mr. Mayou had referred to boils as primary foci, but he thought both boils and the eye infections were secondary. Mr. HOLMES SPICER and Mr. STEPHEN MAYOU replied.

Dr. A. HUGH THOMPSON (London) read a paper on the **operative treatment of high myopia.** He discussed operative procedure, the degree of myopia justifying the operation, and the age at which it is most favorable. He did not consider that operation checked the progress of myopia, so that it might be done for a less degree in the young than in the old. Much choroidal degeneration contra-indicated the operation, but this was not more likely to take place after an operation than before. The conditions of the second eye had to be taken into consideration. There was no use operating if the other was emmetropic; then they could not take the risk if the other was seriously diseased. He then gave the visual and after-histories in 20 cases he had operated upon. These required altogether 65 operations. Distant vision was improved in 17 cases; in 10 it was better without a glass than it had been before with glasses. Of the three failures, one developed a thick cyclitic membrane. One was a brilliant success for five years, then had grave cyclitis, and the third had a macular hemorrhage eight months after operation. He did not think that the operation caused any serious increase of liability to detachment of the retina. The liability was perhaps enhanced if vitreous opacities were present before

operation, or if much vitreous was lost at the operation. If the operation had a bad influence he would expect it to be exerted within a year of its performance.

Mr. CHARLES WRAY (London) said he found that recent statistics confirmed results he published some years ago, that the removal of the lens did not stop the progress of the myopia. He thought the operation seriously increased the risks of blindness, and cited three cases of young subjects whom he had recently seen quite blind.

Mr. HILL GRIFFITH (Manchester) said he had operated upon 40 or 50 cases, and in no case had the eye been lost. He did free discission followed by suction. He never attempted the operation unless No. 1 Jaeger type could be deciphered. He did not think the operation induced detachment of the retina unless acute cyclitis followed, and this might occur in any extraction, infantile or senile.

Major GIDNEY said his experience of the operation was satisfactory. Dr. THOMPSON replied.

Mr. ARTHUR H. BENSON (Dublin) read a paper on the **method of enlarging certain forms of contracted socket.** He entered a plea for the more extended use of mucous membrane from the mouth as grafts instead of skin and epithelial flaps as plastic operations. The floor of a shallow socket was split longitudinally, and the gap left in the conjunctiva lined with a flap from the inside of the lip. The flap was sutured in place, and the socket then packed with pellets of cotton wadding impregnated with xeroform, so as to put the lids on the stretch, the whole being bandaged firmly and left for two or three days. He said that mucous grafts were extraordinarily tolerant of removal and transplantation, that no elaborate precautions were necessary as with skin grafts. Further, the membrane of the lips being educated to withstand pressure of teeth would tolerate the pressure of a shell.

Lieut.-Col. L. J. PISANI, I.M.S., read a paper on the **conditions which may account for the greater prevalence of cataract in India.** From an examination of the statistics of cataract operations performed in Government and State institutions, it appeared that cataract was twice as prevalent

in the Northern provinces as it was in the lower and Burma provinces. Comparing certain provinces, the difference was intensified, and incidence four times greater for the Northern provinces was found. Next he examined the climatic conditions of these provinces, and showed that they were marked by intense light and glare, both from direct sunlight and reflection from the bare soil; and also by great dry heat. He discussed the influences of intense light, and the influence of heat in the production of cataract. So far as experimental work had been conclusive, heat effect seemed more likely to cause cataract than light. The food factor he thought of little influence, for the whole of the common people in India lived on similar food. The ultra-violet rays did not seem to exert serious influence, seeing that cataract was less prevalent in mountainous regions where the rays abound. It was possible, he concluded, that one form of cataract might be produced by different causes, but that in any case a senile lens was a necessary condition. It was at the time of failure of accommodation that the liability was greatest. On the whole, he thought the prevalence of cataract in India was mainly attributable to exposure to prolonged intense dry heat which affected the aqueous, and secondarily the lens.

Mr. CHARLES WRAY (London) said the relation of humidity to cataract was in confirmation of his observations that cataract in England was most frequent in abnormal water drinkers.

Major GIDNEY, I.M.S., thought the essential factor in the production of cataract was premature senility, and climatic influences were of little consequence. He said little reliance could be placed on official statistics of cataract extraction because they took no account of the enormous number of cataracts which were daily operated upon by quacks.

Mr. ANGUS MACGILLIVRAY (Dundee) said he had a considerable knowledge of Anglo-Indians engaged in the jute trade, but did not find that a residence in India increased their liability to cataract.

Colonel PISANT replied that the jute trade was carried on in the moistest part of India, where cataract was less prevalent.

Mr. CECIL SHAW (in the chair) said that reference should

be made to the recent report of the Belgian Ophthalmological Society into the causes of accidental injuries to the eyes by electricity. There was an admirable summary of the influence of extreme light effects, and there appeared a large number of cataract cases.

Mr. A. F. MacCallan, Chief Ophthalmic Inspector in Egypt, read a paper on **five months' work in Luxor in 1910.** He sketched the arrangement now existing for the treatment of eye disease in Egypt, and gave some statistics of the incidence and variety of disease. One of the branches of their work was the inspection and treatment of school children in certain towns. Ninety-six per cent. suffered from trachoma. Three years' work in one school had reduced the proportion to 43%. Beside combating trachoma, much work had been done in cataract extractions and in relief of glaucoma.

FRIDAY, JULY 29, 1910. MR. CHARLES HIGGENS, LONDON, PRESIDENT.

Dr. Risien Russell (London) opened a discussion on the **diagnostic values of ophthalmoplegia, partial and total.** Paralysis of ocular muscles had always been regarded as one of the most reliable signs of organic disease, as opposed to the functional affection of the nervous system, and he saw no reason to question the correctness of that view. A transient diplopia might suggest a functional origin, but there was much to suggest the possibility of its being an organic and early manifestation of grave disorders, such as disseminated sclerosis. Both paralysis and spasm of muscles had to be considered; failure to do this would cause error by overlooking myotonus, a characteristic of Thomsen's disease. On the other hand, a definite paralysis was an invaluable aid in distinguishing such similar affections as neurasthenia and myasthenia. In the former it was absent, in the latter it was a recognized feature. Paralysis of eye muscles excludes not only functional disorders, but many organic disorders of the nervous system, such as subacute combined degeneration of the spinal cord and the ordinary varieties of peripheral neuritis, in contrast to disseminated sclerosis and tabes. The importance of ocular paralysis as a diagnostic feature of intracranial tumor could not be over-estimated, yet in this

connection the rare condition of migraine ophthalmoplegique had to be held in mind. The localization of intracranial tumors was aided by consideration of the ocular paralyses. As regards the weight to be attached to mode of onset and progress of the paralysis, he said that sudden onset did not necessarily imply vascular lesion and contra-indicate sclerosis. Experience proved the contrary. He did not think much reliance could be placed on the combination in which ocular muscles were affected in distinguishing lesions of the nuclei and those of the nerves. He had experience of clinical symptoms pointing to central lesion which were in reality due to peripheral affection. Combinations of ocular paralyses had their value, but they must not be too rigidly insisted on. Lastly, he urged the importance of making a thorough general examination of the patient before ever one was justified in making a diagnosis from what appeared to be the most conclusive ocular symptoms. Examination of the blood, of cerebro-spinal fluid, and of specific tests, such as Wassermann's, were necessarily correlations. Syphilis was the cause of many of these lesions yet the fact that they improved with anti-syphilitic remedies was not certain proof of such a primary origin of the affection.

The PRESIDENT said he had always looked upon these ocular paralyses as indications of grave disease, and he was accustomed to warn patients' medical advisers to that effect; yet subsequent events did not bear out that prognosis always, at any rate for many years.

Mr. L. VERNON CARGILL (London) continued the discussion. He took for granted the certain diagnosis of ophthalmoplegia, and the exclusion of such functional causes as refraction concomitancy, and hysterical causes. There were cases of the gravest organic disease where diplopia was not manifest, such as in the conjugate paralyses of cortical and subcortical lesions, and replaced by vertigo and false or excessive projection of the paralyzed side. It was also absent in cases of double ophthalmoplegia externa, the patient moved the head instead of the eyes, and he might be unaware of the defect. It very frequently happened that the oculist was the first to detect the oncoming of serious nerve disease by the discovery of pupil

derangements, and in this connection they must be prepared to undertake a thorough general examination of such patients, or hand them over to the neurologists. The history of the oncoming diplopia was of the greatest value in determining its importance, and although this might be complicated by symptoms that were obtrusively hysterical, that did not disprove the presence of an organic lesion; hysterical symptoms could be distinguished by their "dissociated" character, and the greater affection of direct and voluntary movements. History was of importance in distinguishing paralysis from mydriasis, myosis, trauma, and post-diphtheritic influences. They had always to be on their guard against fixity of pupils from old inflammation. Occasionally by such means alone a diagnosis could be made; further, intraocular examination might afford valuable help, tuberculous or syphilitic mischief, retinal arterio-sclerosis, or diabetic or renal retinitis might be detected. The presence of papillitis or primary optic atrophy might shed a flood of light on the accompanying ophthalmoplegia. There might be orbital tumors or signs of old injury. There were cases of isolated ocular paralysis, mostly of the external rectus, which appeared due to rheumatism; there the neuritis was probably similar to Bell's paralysis. He had notes of two cases where paresis of the superior oblique was accompanied by pain at the pulley, and probably indicated a fibro-synovitis. He asked if rheumatic myositis or fibrositis might not pick out an extraocular muscle and be indicated by local pain on movement, with tenderness or even slight œdema; these cases cleared up readily with suitable treatment.

Dr. E. FARQUHAR BUZZARD (London) dealt particularly with the pupil phenomena of ophthalmoplegia. The value of the Argyll–Robertson pupil in the diagnosis of syphilitic disease could hardly be over-estimated, notwithstanding that a satisfactory anatomical explanation was wanting. He then dealt with two cases of women who suffered from paroxysmal headache of great severity, vomiting, and some degree of optic neuritis, where pupillary symptoms were marked. There were inequality and failure of reaction to light. Post-mortem, there was found in each case a small cyst within the

third ventricle. From these and other cases he concluded that failure of the pupillary light reflex was a valuable sign of gross disease in the third ventricle, or in the structures immediately surrounding it, and that it not infrequently constituted the first localizing evidence of that disease. Further, they must remember that the light reflex was only lost in actual eye disease when it reached to optic atrophy; it persisted even in severe papillitis. Failure of the light reflex indicated grave disease, deep-seated and central. When tumor was suspected the possibility of operation was totally excluded, since the lesion was too deep for eradication. Decompression might, however, be resorted to.

Dr. W. B. WARRINGTON (Liverpool) commented upon the occurrence of apparently simple cases of single ocular muscle paralyses without indications of grave general disease.

Mr. N. BISHOP HARMAN (London) said he believed that there were many cases of **single muscle paralyses** which were due to exposure to unusual extremes of cold. He had heard no reference to them in the able papers of the neurologists. Mr. Cargill indicated that he recognized rheumatic cases. He could only suppose that these cases did not come into the hands of the neurologist, or else were they to conclude from such a warning as Dr. Russell had given that these were all precursors of grave disease such as disseminated sclerosis? Mr. Harman instanced the case of a man who had been exposed throughout the whole day to a cold East wind on a motor boat, so that he felt ill. The succeeding day he awoke with diplopia due to paresis of one external rectus. There were no other symptoms, and good evidence against syphilis. Was it not more likely that such a case was a genuine peripheral neuritis, similar to Bell's paralysis, rather than a precursor of grave disease? He concluded that these cases did occur, and fairly frequently. Acting upon this view, he discarded antisphilitic measures, and prescribed strychnin. In the case he instanced, cure was established in three weeks. To view such cases gravely, and to give serious warning to the patient or his medical attendant was to court trouble.

The PRESIDENT said he doubted if these cases ever got to

the neurologist; to him the diagnosis was established in that they got well.

Dr. R. A. REEVE (Toronto) concurred in the influenceof exposure to cold causing isolated paralyses; often he found evidence of deep-seated pain.

Miss AMY SHEPPARD (London) said she had seen similar cases, and obtained evidence of tenderness in the region of the affected muscle.

Mr. A. W. ORMOND (London) questioned whether the cases really got well. Was the relief only temporary? And if exposure could be credited with the occurrence why were these cases not more frequent?

Mr. ANGUS MACGILLIVRAY (Dundee) said he agreed with Mr. Harman in the existence of the cases. But he found that six weeks was the usual duration. He gave a guarded prognosis until the six weeks were up. If in that time the paresis had not passed, he considered that the prognosis was grave, and indicative of ultimate central disease. He had not found local pain in the temporary cases, but he was sure syphilis was not a necessary factor; further, some of these cases he had watched for twenty years and more, and there had been no recurrence, and no subsequent grave effects.

Mr. HILL GRIFFITH (Manchester) asked if Dr. Russell made use of electrical reactions as an aid to diagnosis. He had seen several cases, and he had had them under observation for many years, where monocular mydriasis occurred without other symptoms. To what lesion could such uncomplicated stationary paralysis be due?

Dr. JOHN HERN (Darlington) said he had seen many cases of **paresis of an external rectus of one eye,** such as Mr. Harman had described, and had watched them for twenty years afterwards, and they had not recurred. It was apparently a peripheral lesion, and should be treated as such where there were no other indications of a central lesion.

Major GIDNEY, I.M.S., said these cases should present no difficulty if syphilis was excluded by the Wassermann reaction.

Dr. RISIEN RUSSELL, in reply, said the observations concerning the pupil reaction by Dr. Buzzard were of the highest importance. Regarding the question of the occurrence

of single paralyses due to cold, brought up by Mr. Harman, and confirmed by so many speakers, he agreed that such cases did occur, and cited one recently seen in an engine driver, in whom cure resulted in three weeks, to his great surprise. Yet their opinion had to be determined on the general question by subsequent history. Mr. MacGillivray and Dr. Hern had watched cases for twenty years, and that gave conclusive evidence. On the other hand, there were many cases of disseminated sclerosis in which history of early single and transitory paralysis was obtained. The presence or absence of syphilis did not prove the point, though it had an important bearing.

Mr. N. Bishop Harman (London) read a paper on the **education of high myopes.** The action of the ophthalmic surgeon in regard to these cases was one of difficulty, especially in London elementary schools, with their huge number of children. It was common to give negative injunctions. Reading and writing were prohibited; sometimes school was prohibited. These negations did not solve the difficulty. Besides, they were inoperative or injured the child. The prohibition of school was a real injury; school now-a-days was a good place where lasting advantage was gained. To stop a child who could read from reading was next to impossible. He then outlined a scheme which was being put into operation in London by the establishment of "myope classes" which he thought would go far to solve the difficulty. The curriculum in these classes was divided into three portions: oral teaching, handicraft, and literary work. The first and most important was taken in company with the normal-sighted in the ordinary school; no books were allowed, and here the main part of their mental instruction was obtained. The other sections were carried on in special classes. Every sort of handicraft that developed feeling rather than sight was practised. And lastly, such knowledge of the ordinary means of communication as they must know was taught by writing free-arm fashion on blackboards. By this means they hoped to train the children in such habits as would spare their eyes undue strain. The success of the work depended upon the intelligence of the teachers. He then

showed the desk furniture he had designed for use in these classes. The desk gave to each child its own table for manual work, and a large blackboard for such writing as was taught. The desk was lent by Mr. George Hammer, of London, for the occasion.

Major G. H. FINK, I.M.S., read a paper entitled a **plea for efficient drainage after cataract extraction.** He favored the use of adhesive plaster dressings after operation. These dressings were particularly useful in preventing patients from handling their eyes and so damaging the tender globe. In cold weather a dry dressing was used, in hot weather a moist one. To obtain the best effects of the dressing, it was necessary to secure free vent of tears or discharges, and this was obtained by inserting a thin rubber tube into the lower conjunctival sac, the ends projecting from the dressing, and through them irrigation could be performed.

Major GIDNEY said he did not think well of the procedure. Irrigation after extraction was likely to damage the tissues and prevent healing by first intention.

The following resolution was then brought forward by Mr. N. BISHOP HARMAN: "In view of the importance of obtaining continuity of treatment of defects of vision in school children throughout the period of education, and of proper co-ordination of medical inspection and treatment, it is the opinion of the Ophthalmological Section of the Association that the organization of school clinics is desirable." In proposing the motion, Mr. Harman said that the subject was being agitated in municipal circles, but they had no concern with that; they were interested in the medical aspect. As members of the Association, they would not be content with any scheme of treatment that did not fairly remunerate the services of the doctor to the State. Attempts had been made to throw the whole work on the voluntary hospitals, but it failed, as they had not the necessary means of coping with such a huge mass of work. Now various schemes were in process of trial: private and public school clinics had been founded in some places, in London some hospitals were subsidized to do the work; Of the principles concerned in the latter arrangement he would say nothing, but the defects of the arrangement were fair

comment. One effect had been that children were refused treatment at many hospitals without school "vouchers" certifying payment. Further, the present arrangement with hospitals entailed an altogether unnecessary loss of time and labor on the parents; it was provocative of ill-feeling and distaste for treatment. A matter of great concern to them from the scientific side of their work was the means of obtaining knowledge of the causes of defects of vision, or the influences that accentuated them. This they could get by a properly-organized scheme of clinics covering definite areas of population, but it was impossible when parents went haphazard to any hospital. It was only by developing this valuable side of their work that they could exert a proper influence in the prevention of disease.

Mr. WALTER EDMUNDS (London) seconded the resolution. He said they ought to recognize that this question affected the great majority of the children of the country, since 86% belonged to the elementary schools, 10% to Poor-law schools and orphanages, and only 4% to private schools. Medical inspection was wasted without arrangements for treatment. He thought arrangements with hospitals were unsatisfactory, for the permanent staff was not large enough, so recourse was had to clinical assistants who were not always experienced. The alternative was school clinics. The resolution did not state how it was proposed these should be worked. He made some suggestions on the point, but said that did not affect the main issue.

Dr. HUGH THOMPSON (London) said it did not matter who did the work, so long as it was properly done and properly organized. There was ample room for voluntary aid and for public work. He detailed the work of a voluntary school clinic which had been worked by him in Woolwich for the past three years; it was a complete success.

Dr. J. A. MENZIES (Rochdale) said the matter had already been settled in Rochdale by the establishment of a school clinic by the Education Authority. The hospital did not consider that it fell within the scope of their charitable work. The children who were found by the medical inspector to require eye treatment were later seen by the ophthalmic surgeon

in a convenient room, and the work was done on the spot. Cases requiring operative treatment were referred to the hospital. The matter had been arranged on business-like lines, and it was a success.

Mr. ANGUS MACGILLIVRAY (Dundee) thoroughly agreed with the motion. He further commented upon the qualification required of candidates for posts of school doctors. They were expected to hold the D.P.H.; that meant they knew everything about bakeries, sewage, and L.G.B. laws, but nothing about schools or school children.

Dr. BEATSON HIRD (Birmingham) supported the resolution. In Birmingham, he said, some of the treatment was being undertaken by the school doctors, and it did not seem satisfactory; special men were required. He then described the working of the school clinic which had been established in a small rural district. The defective children were examined on Saturdays in the schools, the parents paid for the glasses, and a small sum for treatment in penny contributions. The work had been done for two years, and was an illustration of effective organization.

Dr. HERN said that at Darlington attempts had been made to throw this work on the hospital, but with the help of the association the attempt had been foiled. It was not necessary they should settle details at this time; the principle of the clinic was the point.

Dr. PHILIP BROOKS (London) said that before he could support such a motion he must know what a school clinic implied. He was opposed to gratuitous work of this kind; and he was opposed to building new and expensive State hospitals for school children.

Dr. HILL GRIFFITH (Manchester) said that in Manchester and Salford they had an extraordinary divergence of practice. These places really formed one city; yet in Manchester the work was thrown on the charitable hospitals, but in Salford a properly paid ophthalmic surgeon had been appointed to do the work in the schools. The matter really rested with the governors of hospitals; they had the control.

Dr. HALDANE COOK (Enfield) called attention to the association's pamphlet No. 25 on this subject. There would

be found a scheme for the working of local school clinics which seemed to promise satisfaction.

Mr. CHARLES WRAY (London) said that at Croydon he did the work for the Education Authority. They had fitted up a room which was really a school clinic, and it was satisfactory.

Dr. R. E. HARCOURT (Liverpool) agreed with the resolution.

Dr. R. LESLIE RIDGE (Enfield) said the establishment of school clinics would do much to aid the prestige of the profession. It was bad to educate the public to rely upon the hospitals.

The PRESIDENT said there could be no doubt some organization was required. He always objected to seeing school children at the hospital. The difficulty was acute in rural districts where special treatment was impossible at present. He read letters which a local authority sent to those who failed to get the vision of their children treated. They were told they were liable to a fine of £100 or two years' imprisonment! This notice had been sent to a woman whose husband had left her, and who kept herself and three children on 12 shillings a week. The whole thing became ludicrous in such circumstances.

The PRESIDENT then put the motion to the vote, when it was carried with one dissentient. There were about 35 present.

The meeting concluded with a vote of thanks to the President of the Section

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD AND FOURTH QUARTERS OF THE YEAR 1909.

By Dr. G. ABELSDORFF, in Berlin; Prof. ST. BERNHEIMER, in Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin; with the assistance of Prof. A. ALLING, New Haven; Prof. E. BERGER, Paris; Prof. CIRINCIONE, Genoa; Dr. DALEN, Stockholm; Prof. HIRSCHMANN, Charcow; Dr. J. JITTA, Amsterdam; Mr. C. DEVEREUX MARSHALL, London; Dr. H. MEYER, Brandenburg; Dr. P. VON MITTLESTADT, Metz; Dr. H. SCHULZ, Berlin; Prof. DA GAMA PINTO, Lisbon; and others.

Translated by Dr. MATTHIAS LANCKTON FOSTER.

Sections IV.–VII. Reviewed by DR. ABELSDORFF, Berlin.

IV.—ANATOMY.

210. KOLMER, W. **A secretion-like constituent of the layer of rods and cones of the retina of vertebrates.** *Arch. f. d. ges. Physiologie*, 120, p. 35.

211. CONTINO, P. **The development of the caruncle and the plica semilunaris.** *Arch. f. Ophthalmologie*, lxxi., 1, p. 1.

212. DE LIETO VOLLARO. **The elastic fibres in the iris of the adult man and some species of vertebrates.** *Arch. f. vergleichende Ophthal.*, i., p. 49.

213. SCHIPERSKAJA, A. K. **Congenital anophthalmia.** *Russk. Wratsch*, 1909, No. 26.

214. DE VRIES, W. M. **Cyclopia.** *Nederlandsch Tydschr. voor Geneeskunde*, 1909, Bd. ii., No. 16.

215. DE VRIES, W. M. **Cebocephalia.** *Ibid.*, 1909, Bd. ii., No. 14.

KOLMER (210, **A secretion-like constituent of the layer of rods and cones of the retina of vertebrates**) found spherical and elliptical drops on the surface of the rods of the retina of vertebrates after fixation in bichromate-formolegg-

albumen. They were plentiful on the retinæ of frogs that had been kept in the dark, and absent in those of frogs that had been exposed to the light. He thinks the substance to be a secretion product of the pigment epithelium.

CONTINO (211, **The development of the caruncle and of the plica semilunaris**) studied eighteen human embryos and nine fœtuses. The formation of the plica semilunaris begins after the adhesion of the margins of the lids. Its thickness remains stationary while it expands in proportion to the growth of the eye; later it does not follow the growth of the eye, so that the cul-de-sac adjoining its posterior surface becomes shallower. The adenogenous cones of the plica, which start as knoblike thickenings of the ectoderm into the mesoderm, usually not more than three or four, remain stationary or retrograde, with the exception of one. As the plica represents the rudiment of the nictitating membrane of mammals, so the adenogenous cones represent the rudiment of Harder's gland. The caruncle appears a few days after the plica as an excrescence formed from ectoderm. In it two portions are to be distinguished, one above, directed forward and joined to the free margin of the lid by ectoderm, the other directed to the lower fornix. The upper portion is separated from the margin of the upper lid by the destruction of the connecting ectoderm. Then the first traces of hair bulbs appear in protrusions of the ectoderm and increase in number till the fifth month. In the sixth month, the sebaceous follicles appertaining to the hair bulbs reach a marked development; sebaceous follicles with outlets of their own were not observed. In the seventh, and particularly in the eighth and ninth months, the connective-tissue stroma of the plica is penetrated by large vessels with areas of lymph elements in their neighborhood.

DE LIETO VOLLARO'S (212, **The elastic fibres of the iris of the adult man and some species of vertebrates**) study of the elastic fibres of the iris gives the following results: 1. The human iris contains in the posterior layers of its stroma a system of not very numerous radiating fibres. Occasional elastic fibres are also found in the sphincter zone, in the loose connective tissue of the pupillary region between the sphinc-

ter and the pupillary part of the lamellæ of the dilatator. 2. The iris of house animals, in which the iris stroma is formed of tense, strong bundles of connective tissue, contains, in addition to a system of radiating fibres in the posterior layers of the iris, numerous elastic fibres running in various directions in the intermediate spaces of the stroma. 3. The iris of birds is very rich in elastic tissue not only in the posterior layers, where it forms a network with radiating meshes, but also in the pupillary part of the sphincter, where it forms a network with the very long meshes arranged concentrically with the pupil. Very many elastic fibres are also to be found in the interstices of the stroma and between the bundles of the dilatator and of the sphincter, both of which consist of transversely striated muscle fibres. 4. The iris of the fish is also richly furnished with elastic fibres in direct union with the dense elastic plexus at the base of the ciliary body. Beside a radiating system in the posterior layers of the iris the entire stroma is penetrated by elastic fibres of varying calibre which run in different directions and at different levels. The sphincter bundles are accompanied by a circular system of fibres distinctly concentric with the pupil.

SCHIPERSKAJA (213, **Congenital anophthalmia**) sought indirectly to answer the question whether anophthalmia is the result of an intra-uterine inflammation, or of inhibited development of the corresponding segment of the brain, through the psychologic test of five anophthalmic girls ranging in age from five to thirteen years. Four of the children were shown to have been intellectually backward, while the fifth was an idiot. HIRSCHMANN.

DE VRIES (214, **Cyclopia**) showed a case of cyclopia in which the eye showed a large coloboma, yet without trace of double origin, while the eye muscles, with the exception of the inferior rectus, the nerves, lachrymal glands, and lids were doubled. The internal rectus was absent. Behind the eye was a cyst arising from the lumen of the primary optic pedicle. He has found two similar cases in literature. B. P. VISSER.

DE VRIES (215, **Cebocephalia**) showed a case of cebocephalia with eye changes. The child lived for some hours. There was a median defect in the bones and soft parts of the head.

The eyes were placed very near together. The nose was rudimentary, ended in a blind pocket, and formed only a single cavity. The orbits were separated only anteriorly. The right was occupied by a large cyst arising from the primary optic vesicle; the left appeared to be empty, but was found by the microscopic examination likewise to contain a cyst as large as a grain of rice. The eye changes are to be looked upon as not belonging to the clinical picture of cebocephalia.

B. P. VISSER.

V.—PHYSIOLOGY.

216. NAGEL, W. **Color change in dichromates.** *Zeitschr. f. Sinnesphysiologie*, 44, i., p. 5.

217. FUJITER, T. **The estimation of the amplitude of movements of objects seen.** *Ibid.*, 44, i., p. 35.

218. BASLER, A. **The perception of movements. Part 3. The disappearance of the after-image of movement.** *Arch. f. d. ges. Physiol.*, 128, p. 145.

219. BASLER, A. **The perception of movements. Part 4. Further observations concerning the perception of very minute movements.** *Ibid.*, p. 427.

220. TICHOMIROW, N. P., and v. BRUECKE, E. TH. **The position of the scintillating limit in direct and indirect vision.** *Ibid.*, p. 177.

221. MARX, E. **The cause of the red color of the normal fundus as seen with the ophthalmoscope.** *Arch. f. Ophthalmologie*, lxxi., 1, p. 141.

222. SCHANZ, F., and STOCKHAUSEN, K. **Concerning fluorescence of the lens.** *Ibid.*, lxxiii., 1, p. 184.

223. NICATI, W. **Human and comparative, normal and pathological, physiology.** Paris, Schleicher frères, 1909, 674 pages.

224. MAKLAKOW, A. **Modifications of the dioptrics of the eye during accommodation (measurements made with Tscherning's ophthalmophakometer).** *Annales d'Oculistique*, cxlii., p. 156.

225. LIBBY, G. F. **A case of complete albinism. Observations on the changes in the diameters of the lens as seen through the iris.** *Trans. Amer. Ophthalm. Soc.*, 1909.

226. HENRI, VICTOR, **The degree of transparence of different glasses to the ultraviolet rays.** *Soc. Française de Physique*, July 2, 1909.

227. VIALE. **A new interpretation of Daltonism.** *Annali di Ottalmologia*, 1908, fascicles 7–8–9, pages 522–530.

228. ANGELUCCI. **The influence exerted by ligation of the ureters upon the passage of fluorescin into the aqueous.** *Archivio di Ottalmologia*, June, 1909.

229. STÄRKE, A. **A hypothesis concerning the movement reflex of the pupils, together with remarks concerning the general diagnostic**

value of the absolute size of the pupils. *Nederlandsch Tydschrift voor Geneeskunde*, 1909, Bd. ii., No. 15.

NAGEL (216, **Color change in dichromates**) has confirmed on other dichromates the observation formerly made on himself, that the perception of red is more certain than that of green. While a large field of red may be well recognized, the certainty with green is less. A large surface of green upon a neutral gray background acts as a contrast exciter so that the latter appears red, but red produces no contrast sensation of green. The spectrally lighted field gives Nagel no specific sensation of green. By tiring with red light the dichromatic eye becomes typically green-blind, just as the dichromatic eye well adapted to the dark is incapable of recognizing red as a pigment color.

FUJITER'S (217, **The estimation of the amplitude of movements of objects seen**) experiment shows that the amplitude of movement of an object between two isolated points is always underestimated in direct vision. The estimations in indirect vision are larger and more nearly correct, and are in many cases over-estimates. When a stationary object is near the moved point, the estimations are more accurate, particularly in direct vision. The color of the illuminated point and the condition of adaptation have no noticeable influence upon the estimates. The eccentricity of the estimates was usually greater in the horizontal than in the vertical meridian of the cornea.

BASLER (218, **The disappearance of the after-image of movement**) found: 1. The after images had at first a fairly great swiftness that gradually became less, so that finally the curve slowly approached the abscissa axis. 2. Persons differed from each other as to the swiftness and persistence of the after-image, and these were usually not the same for the same person at different times. 3. The longer the original lasted, the quicker the after-image appeared and the longer it persisted. 4. In indirect vision, the same original produced a much more rapid and more persistent after-image than in the direct. 5. The greater the moved surface was in the direction in which the movement was made, the more marked was the after-image. 6. A change in the size of the moved surface in the

direction in which the movement did not take place had no influence upon the swiftness or duration of the after-image. 7. A moved field consisting of narrow black lines placed closely together upon a white background produced a much stronger after-image than one composed of broad bands placed farther apart. 8. A quickly ending movement produced a much more rapid and an extraordinarily more persistent after-image than one that ended slowly. 9. The time that elapsed between the discontinuance of the original movement and the appearance of the after-image was certainly less than $\frac{1}{8}$ second. 10. When the objective movement was registered by a suitable arrangement which compensated the apparent movement of the after-image, the above results were confirmed even though the after-image was less strongly marked.

BASLER (219, **Further observations concerning the perception of very minute movements**) has confirmed by a new method his former observation that a movement can be perceived between two points that lie so near together that they cannot be distinguished as separate.

TICHOMIROW and v. BRUECKE (220, **The position of the scintillating limit in direct and indirect vision**) have studied anew the question as to the power of the centre and periphery to perceive intermittent stimulations as such because of the contradictions existing between individual observers. He used whirling disks with black and white sectors and found that both in the dark-adapted and the light-adapted eye the scintillating limit is higher in the periphery than in the centre of the retina. Within a certain condition of adaptation this condition is reversed and the pre-eminence of the centre over the periphery can be shown. The sinking of the scintillating limit for all parts of the retina with increasing dark adaptation may thus run differently in the centre and in the periphery. The differences in the results obtained by different authors are probably a consequence of individual variations of the adaptation.

MARX (221, **The cause of the red color of the normal fundus as seen with the ophthalmoscope**) examined spectroscopically the red color of the human fundus. As the absorption stripes of the blood are absent, but the oxyhæmo-

globin stripes present, in the red of the fundus of albinotic rabbits, it follows that in the normal eye a layer situated in front of the choroid must absorb the light thrown back by the choroid. This layer is to be sought in the brown retinal pigment, which is the groundwork of the red color. Enucleated human eyes from which the blood has been washed after removal of the sclera appear red when illuminated. Pigment epithelial cells appear red to orange in concentrated light. A spectroscopic examination of the retinal pigment cells gives the same spectrum as that of light coming from the pupil of the living eye, yet the clouding in the yellow is not so great as in the living eye.

SCHANZ and STOCKHAUSEN (222, **Concerning fluorescence of the lens**) have studied the spectrum of the fluorescence of the lens induced by the ultraviolet light and are convinced that, contrary to their former theory, in fluorescence of the lens not only do the ultraviolet rays become visible, but there is also a transformation of short-waved light into light of longer-wave length.

NICATI (223, **Human and comparative, normal and pathological physiology**) outlines our present knowledge of the physiology of the eye in man and the lower animals. The work is divided into two parts: the first dealing with the optics, the second with the mechanics, of the eye. In the former, the light-producing organs of some animals, refraction, and the light sense are considered; in the latter, the nutrition, blood circulation, lymph movement, intraocular tension, and the movements of the pupils and of the lids. Under light sense the author presents his own views on the acuteness of vision and its determination. In regard to the harmony of colors his studies have led him to conclude that there exist certain analogies between harmony of color and of tone, He distinguishes three fundamental harmonies, differential harmonies in intervals, mechanical harmonies or chords, and complementary harmonies or contrasts. He believes that the aqueous is absorbed through the stomata of the iris into the lymph tracts of the iris, to pass then into the periocular lymph channels. In connection with intraocular tension he decribes his spirometer. He thinks that there are fluctuations

of the intraocular tension which depend not on the blood pressure, but are a consequence of the contractility of the capsule of the globe. BERGER.

MAKLAKOW (224, **Modifications of the dioptrics of the eye during accommodation**) concludes that Tscherning's theory alone can explain all the symptoms of accommodation. He considers that in the beginning of accommodation there is a change in only the curvature of the anterior surface of the lens and that as the accommodative effort becomes greater the increase of curvature extends to the posterior surface. He believes that the muscle of accommodation by its contraction produces pressure upon the anterior margin of the vitreous so as to increase the concavity of its anterior surface, into which the posterior surface of the lens is pressed during accommodation. In many cases Maklakow found the latter symptom alone during accommodation without any notable change of the curvature of the anterior surface of the lens. This was very distinct in a man forty-three years old and was ascribed to a rigidity of the lens fibres due to age. BERGER.

LIBBY (225, **A case of complete albinism. Observations on the changes in the diameters of the lens as seen through the iris**) found the lens diameter with the eyes accommodating at 40*cm* to be 9.5*mm*. Under eserin it was 9*mm* and after atropin 10*mm*. ALLING.

HENRI (226, **The degree of transparence of different glasses to the ultraviolet rays**) has studied the absorption of the ultraviolet rays by various kinds of glasses and finds ordinary glass a better protection against the ultraviolet rays than the Fieuzal glass. He recommends that spectacle glasses should be covered with a thin layer of picrin-gelatin by which not only the ultraviolet rays, but also a part of the blue and violet rays will be absorbed. BERGER.

VIALE (227, **A new interpretation of Daltonism**) thinks that Daltonism is not an insufficiency of sensation dependent on an anatomical incompleteness, but a difference of the initial condition which in the normal eye is presented as the result of stimulation with red light and the condition of the retina is correspondingly modified to red. As the workman from long habit no longer perceives the noise in which he is accus-

tomed to work, so in Daltonism red no longer makes an impression because it is permanent and continuous in the centre.

CALDERARO.

According to ANGELUCCI (228, **The influence exerted by ligation of the ureters upon the passage of fluorescin into the aqueous**) the secretion of the aqueous may be affected not only by direct nervous influences, but also by the action of substances which modify the composition of the blood, either introduced artificially into the organism, or produced abnormally from retained excretions. After the ligation of the ureters in a dog the passage of fluorescin into the aqueous took place about an hour later than under normal conditions.

CALDERARO.

STARKE (229, **A hypothesis concerning the movement reflex of the pupil, together with remarks concerning the general diagnostic value of the absolute size of the pupils**) bases his hypothesis concerning the convergence reflex of the pupils upon the fact, well known in neurology, that the effect of a stimulation of a nerve is dependent on the position of the reflex tract. The higher this is, the greater is the energy released. For optic stimulations there are two fundamentally different systems which govern the tonus of the sphincter pupillæ, the deeper tract over the corpora quadrigemina and the higher over the pulvinar thalami optici. The association of attention with the light stimulus gives the greatest contraction of the pupils. The common reflexes from accommodation, convergence, and light go through the quadrigeminal tract, and everything that distracts the attention from the light stimulus acts to dilate the pupils. The author studied the influence of the two systems upon the convergence contraction in two ways: 1. He had a patient with amaurosis of the left eye converge while the right eye was covered; the pupil contracted but little. 2. By instantaneous photography of convergence in the dark, which showed that the convergence reflex was in great part a cortical reflex.

P. B. VISSER.

VI.—REFRACTION AND ACCOMMODATION.

230. THORINGTON, J. **The visual acuity under definite conditions**

is an index of the strength of the necessary spheric lens (plus or minus) which will give a vision of $\frac{6}{6}$ or more. *Annals of Ophthal.*, July, 1909.

231. HILLEMANNS. **The testing of vision with artificial illumination and disturbance of the light sense, especially in myopia.** *Klin. Monatsbl. f. Augenheilkunde*, xlvii., ii., 3, p. 302.

232. LANDOLT, H. **Myopia and the light sense.** *Ibid.*, xlvii., ii., 4, p. 369.

234. KUSCHEL. **The behavior of the accommodation apparatus in axial lengthening of the eye.** *Zeitschr. f. Augenheilk.*, xxii., 4, p. 283.

THORINGTON'S (230, **The visual acuity under definite conditions is an index of the strength of the necessary spheric lens (plus or minus) which will give a vision of $\frac{6}{6}$ or more**) observations elaborate the point made use of by all ophthalmologists, that the visual defect capable of correction to normal vision when the eye is myopic or under a cycloplegic is proportionate to the amount of the error. ALLING.

HILLEMANNS (231, **The testing of vision with artificial illumination and disturbance of the light sense, especially in myopia**) claims that artificially illuminated test types have disadvantages as well as advantages in that the artificial illumination very often deceives concerning the real capacity of the eye under natural conditions and renders the recognition of disturbances of adaptation difficult. Disturbances of the light sense play a notable part in the pathology of myopia; they increase in frequency with the rising degrees of myopia, and are in no way dependent on ophthalmoscopically perceptible changes in the macula. They show themselves: (*a*) by a retarded adaptation in testing the vision with unsatisfactory illumination and by study of the differential sensitiveness; (*b*) by hemeralopic vision, *i.e.*, vision disproportionately reduced when the illumination is diminished; (*c*) by hemeralopic central and peripheral disturbances of the field of vision; reduction of the central and peripheral perception of blue, central and peripheral scotomas for white, etc. Nyctalopic troubles are demonstrable in myopia only when they are present in spite of full correction, because the disadvantages of the dilatation of the pupils in poor illumination become much more notable when the correction is absent.

LANDOLT (232, **Myopia and the light sense**) tested the light sense by ascertaining the vision with artificial light in a dark

room, then reducing the illumination a fixed amount twice and determining the vision at each step. In this way he found that the light sense is not influenced by myopia unless marked chorio-retinal changes are present, and that these do not always reduce the light sense. Astigmatism plays no part in diminution of the light sense. Vision and light sense are not interdependent, but age appears to reduce the light sense in all conditions of the refraction.

KUSCHEL (234, **The behavior of the accommodation apparatus in axial lengthening of the eye**) thinks that an increase of the vitreous tension takes place at the beginning of accommodation, but with the compression of the vitreous by the ciliary muscle an evacuation takes place, so that in the final stage of the act of accommodation the vitreous tension is disposed of. The accommodation apparatus consists of (1) the ciliary muscle; (2) the lens; (3) the fibres of the zonula; (4) the vitreous tension. Each of these may be the seat of disturbance. In the advance of the process for increasing the refraction, the need of the compression of the vitreous becomes greater, that of the accommodation less, so it results that the actual work of Bruecke's muscle and the function of Mueller's muscle are abolished, and finally, with the further increase of the contents of the vitreous even the Bruecke's muscle that has become hypertrophic becomes atrophic. As the formation of the higher conditions of refraction takes place during the embryonic life of man, the lens may be ignored because of its elastic softness and lability. The fibres of the zonula and the vitreous are more important. The great tension of the zonula fibres backward and outward results finally in an overstretching and relaxation of the fibres. In the higher degrees of myopia which are usually associated with fluid vitreous, the zonula and lens system is relaxed and the current-regulating function of the vitreous, which chiefly acts to maintain equilibrium by its resistance, is annihilated.

VII.—MUSCLES AND NERVES.

235. MOTAIS. **Operation for ptosis by the substitution of a flap from the superior rectus muscle.** *Ophthalmoscope*, Sept., 1909. (The operation was performed by Dr. Motais before the members of the Oxford Ophthalmological Congress, July 16, 1909.)

236. BRIGGS, H. H. **A new method of tendon shortening.** *Jour. Amer. Med. Assoc.*, Sept. 11, 1909.

237. MURRAY, A. **Congenital absence of abduction and adduction; voluntary recession of the globe with simultaneous contraction of the lid fissure.** *Ophthalmic Record*, Sept., 1909.

238. FRANCKE, E. **Congenital cyclic oculomotor paralysis and hippus of the iris.** *Klin. Monatsbl. f. Augenheilk.*, xlvii., ii., 5, p. 582.

239. v. SICHERER. **Another contribution to the heredity of squint.** *Muenchener medizinische Wochenschrift*, 1909, No. 52, p. 2707.

240. BARANY, R. **Paralysis of the vestibular fibres of inhibition in a case of paralysis of the movement of the eyeball.** *Medicin. Blaetter*, xxii., No. 43, p. 502.

241. DRANSART. **The pathogeny of miner's nystagmus.** *Soc. d'ophtalm. de Paris*, Oct. 12, 1909.

242. BUTLER, T. HARRISON. **Miner's nystagmus.** *Ophthalmoscope*, Aug., 1909.

243. VEASEY, C. A. **Ophthalmoplegic migraine involving the abducens nerve, with report of a case.** *Ophthalmic Record*, Aug., 1909.

244. VILLEMONT DE LA CLERGERIE. **Total sensory-motor ophthalmoplegia of the right eye with blindness.** *Archives d'ophtalm.*, xxix., p. 623.

245. MARKOW, J. E. **Neuralgia of the eye.** *Westn. Ophth.*, 1909, No. 10.

MOTAIS. (235, **Operation for ptosis by the substitution of a flap from the superior rectus muscle.**)

1st Stage. Having everted the upper lid, stretch the upper fornix with two sharp hooks, one being inserted into the sclerotic above the cornea, and the other into the ciliary margin of the everted upper lid.

2d Stage. Cut the conjunctiva over the insertion of the rectus muscle, prolonging the incision beyond the lateral limits of the tendon. Separate the subconjunctival tissue and capsule of Tenon, so as to expose the tendon.

3d Stage. Pass a large strabismus hook under the tendon, from the inner side, and raise the tendon.

4th Stage. With a double-toothed forceps, seize the centre of the tendon three or four millimetres from its insertion; then with a curved scissors, make a central incision, four millimetres broad, quite close to the sclerotic, in front of the forceps.

5th Stage. Take hold of the "sectioned" portion of the tendon with a broad-pointed fixation forceps, so as to stretch

it out well. Then, with straight scissors make two parallel incisions upwards, one at each side of the tendon, thereby making a flap one centimetre in length.

6th Stage. Raise the small flap, and pass a catgut or reindeer tendon suture, by means of two curved needles, through the flap, near its free border. Tie the suture, which thus seizes the centre of the tendon in its grasp.

7th Stage. Incise the central portion of the conjunctival cul-de-sac with the curved scissors, pass the blades between the tarsus and the soft tissues, and separate the former from the latter by a few snips of the scissors, up to the ciliary margin of the lid, so as to make a path in the substance of the lid for the flap of tendon.

8th Stage. Pass one of the needles in through the space thus made, and bring it out through the skin near the ciliary margin. The flap will be thus drawn up. Pass the second needle in a similar manner, bringing it out a few millimetres from the other. Tie the ends over a pledget of lint.

9th Stage. Suture the conjunctiva with catgut.

10th Stage. To prevent lagophthalmos, raise the lower lid until it comes into contact with the upper, by means of a suture passed through the lower lid near the ciliary margin, and then through the skin of the eyebrow, and draw it sufficiently tight. T. HARRISON BUTLER.

BRIGGS (236, **A new method of tendon shortening**) offers a novel operation which consists in drawing a loop of tendon through an elliptical ring of silver wire. When the desired degree of shortening is attained, the ring is compressed by a special forceps so as to hold the loop in place. It is removed later with a wire-cutting forceps. The principal advantage of the operation is its simplicity. ALLING.

MURRAY'S (237, **Congenital absence of abduction and adduction; voluntary recession of the globe with simultaneous contraction of the lid fissure**) case differs from the majority of examples of this affection in that there was no convergence and an absence of lachrymation in the eye involved. This was probably due to congenital defect in the lachrymal gland. ALLING.

FRANCKE (238, **Congenital cyclic oculomotor paralysis and**

hippus of the iris) reports two cases of congenital monocular oculomotor paralysis in which the pupils, which did not respond to light, showed a constantly fluctuating contraction and dilatation. When looking toward the nose the pupils contracted, and in one the simultaneous contraction of the ciliary muscle could be determined by the skiascopic measurement of the increase of refraction. Inclusive of these only ten such cases are to be found described in literature.

V. SICHERER (239, **Another contribution to the heredity of squint**) met with a family of eight children, six girls with convergent strabismus of the left eye and two boys who had no strabismus. The squinting sisters were all hyperopic and had amblyopia with a central scotoma of the squinting eye. The parents had no strabismus, but the two brothers of the mother did squint, while her two sisters did not. So far as could be ascertained by an investigation of four generations, the strabismus affected alternately the boys in one generation, the girls in the next, and throughout the entire family the left eye was the one affected. .

BARANY (240, **Paralysis of the vestibular fibres of inhibition in a case of paralysis of the movement of the eyeball**) observed in a patient with disease of the pons paralysis of the movement of the eyes to the left, paresis of movement to the right, restriction of movement upward, good movement downward, and good convergence. The production of a vestibular irritation which should normally induce nystagmus to the left caused both eyes to move far over to the right; attempts to produce nystagmus to the right caused deviation to the left; attempts to produce nystagmus upward caused deviation downward; and a stimulation that would usually cause nystagmus downward produced deviation upward. The patient thus exhibited no vestibular nystagmus, but only vestibular deviation. The writer gives the following explanation: with the vestibular innervation of the eye muscles—*e.g.*, to move to the right, is normally associated an inhibition of their antagonists. This vestibular inhibition brings about an accumulation of tonic powers in the supranuclear centre for the movement to the left until they break through the inhibition to a certain extent and cause the quick movement to the left. Thus vestibular

nystagmus is dependent on the presence of the vestibular inhibition. When this is absent the vestibular deviation will take the place of the vestibular nystagmus with intact voluntary mobility. As in this case mobility downward was present, Barany made the diagnosis of paralysis of the vestibular fibres of inhibition.

DRANSART (241, **The pathogeny of miner's nystagmus**) has studied over 3000 cases of miner's nystagmus. He differentiates two forms, a mild form in which the oscillations are not very marked, and a severe form in which the oscillations are very frequent and broad, in many cases associated with diplopia, amblyopia, and hemeralopia. The movements of the eyeball are always excited by looking upward and discontinue on looking downward. The patients come to the physician with their heads inclined backward. He believes that this nystagmus can be explained only by the overweariness of the ocular muscles that turn the eye upwards, and that the bad illumination and disturbances of the accommodation play only a subordinate part. Anæmia and bad air in the mines he considers as of certainly no importance in the etiology of this form of nystagmus. BERGER.

BUTLER (242, **Miner's nystagmus**). The paper gives an account of the symptoms of the disease and discusses the etiology. The views of Simeon Snell have been accepted almost without examination, and have been copied from text-book to text-book as though they were above criticism. A very superficial investigation of the muscle-fatigue theory shows that it does not explain all the facts of the disease. The author accepts Reid's theory that miner's nystagmus is the result of changes in the cerebral co-ordinating mechanism. The darkness of the mine is the most important but by no means the sole etiological factor. T. HARRISON BUTLER.

VEASEY (243, **Ophthalmoplegic migraine involving the abducens nerve, with report of a case**) describes the symptoms of this affection as divided into two periods. First the period of pain, which usually comes on suddenly and is confined to one side. Its duration is variable and usually terminates with vomiting. Upon the disappearance of the pain and vomiting, paralysis, generally of the oculomotor nerve,

sets in. The fourth and sixth are sometimes also involved. The paralysis is usually confined to one eye and after repeated attacks may be permanent. ALLING.

VILLEMONT DE LA CLERGERIE (244, **Total sensory-motor ophthalmoplegia of the right eye with blindness**) describes a new case of unilateral paralysis of all the nerves supplying the eye, together with optic atrophy in a woman fifty years old. Recovery followed injections of mercuric iodide, except that the eye remained blind. The author claims that the result of the mercurial treatment disclosed the syphilitic nature of the total sensory-motor paralysis of the right eye, and thinks that the pathological process was situated in the sphenoidal fissure. BERGER.

MARKOW (245, **Neuralgia of the eye**) protests against the inaccuracy in the classification and naming of the neuralgic diseases of the eye and the consequent defectiveness of clinical analysis. He suggests the following classification as resting on an anatomical basis: neuralgias in the region of the first branch of the trigeminus, to be designated ocular neuralgias, and, according to the region affected: (1) neuralgia supraorbitalis; (2) neuralgia nervi lacrymalis; (3) neuralgia nervi ciliaris, or neuralgia corneæ. Neuralgias of the infraorbital nerve have almost never been mentioned, probably because they have been treated as a part of facial neuralgia. The painful inflammations of the cornea are to be excluded from the group of neuralgias. According to the experience of the author, the cause of these neuralgias is usually malaria, but constitutional diseases, such as anæmia, neurasthenia, hysteria, as well as chilling, rheumatism, and the general infectious diseases, particularly typhoid and influenza, not rarely give rise to neuralgia of the eye. Climatic and geographic conditions seem to exert no marked influence on the statistics of ocular neuralgias. In the treatment the underlying disease must not be neglected. HIRSCHMANN.

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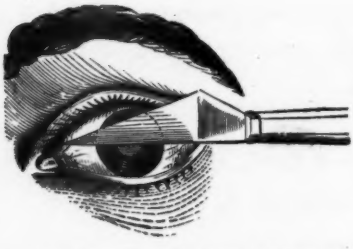

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